PAINT and VARNISH Production

THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHES

This is the front cover of the new, revised data file on ADVANCE ZIRCO Drier Catalyst 6%. Completely revised, the data file has been brought up-to-date with new data sheets, new recommendations, more information—more suggestions on how ZIRCO can help you improve your product.

DIVISION OF CARLISLE CHEMICAL WORKS, INC.

ADVANCE
SOLVENTS & CHEMICAL
245 FIFTH AVENUE, NEW YORK 16, N.Y.

This ZIRCO data file belongs on your desk, now!

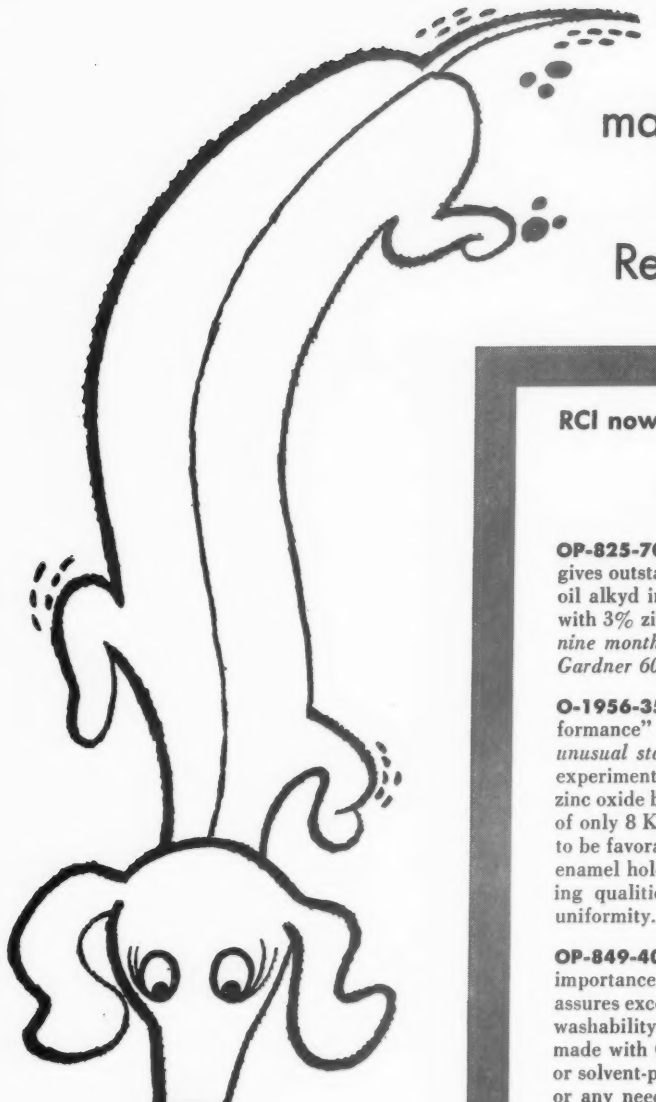
Fill in the handy coupon for your copy.

Advance Solvents & Chemical, 245 Fifth Avenue, New York 16, N. Y.
GENTLEMEN: *Please send me the new ZIRCO Data File.*

NAME..... TITLE.....
COMPANY.....
ADDRESS.....
CITY..... ZONE..... STATE.....

APRIL
1956

If you're getting into odorless paints, make tracks for RCI's **new** Alkyd Resins



RCI now offers 3 alkyds especially developed for use with odorless solvents.

OP-825-70 BECKOSOL in odorless enamel formulations gives outstanding gloss retention. We have tested this drying oil alkyd in typical architectural white enamels formulated with 3% zinc oxide based on titanium dioxide content. *After nine months interior exposure, they register over 90 on the Gardner 60° Glossmeter.*

O-1956-35 WALLKYD is recommended for "premium performance" odorless flat wall vehicles. This pure alkyd has *unusual stability properties* with or without zinc oxide. An experimental flat paint formulated at 65% PVC with 2% zinc oxide based on total pigment showed a viscosity increase of only 8 Krebs Units after three months. And you're bound to be favorably impressed by this new Wallkyd's exceptional enamel holdout at wide PVC ranges . . . its improved brushing qualities . . . its non-penetration . . . and its sheen uniformity.

OP-849-40 WALLKYD has advantages where cost is of prime importance to formulators. This low-cost modified alkyd assures excellent brushability and non-penetration, plus good washability. It's worth remembering, too, that flat vehicles made with OP-849-40 can be used with the new water-phase or solvent-phase tinting colors without reduction in viscosity, or any need for adding aromatic thinners to promote compatibility.

Perhaps one of these new RCI alkyds can help *you* develop a superior finish or improve an existing formula. Write RCI for full information and working samples.

RCI

Creative Chemistry . . . Your Partner in Progress

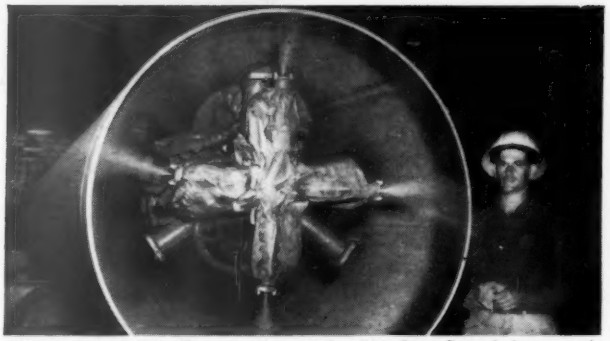
REICHHOLD

Synthetic Resins • Chemical Colors • Industrial Adhesives • Plasticizers
Phenol • Formaldehyde • Glycerine • Phthalic Anhydride • Maleic Anhydride
Sodium Sulfite • Pentaerythritol • Pentachlorophenol • Sulfuric Acid

REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N. Y.

EPON® RESIN does it!

New Internal Coating *protects pipelines against corrosion by crude oil, salt water, gas*



36" pipe to be laid by Transcontinental Gas Pipe Line Corp. being coated with *Copon*, containing Epon resin. *Copon* is manufactured by Coast Paint and Lacquer Co., Houston.

Stock of 36" pipe, lined with Epon resin coating, to be used by Transco.

HERE'S HOW...

INTERNAL CORROSION of gas pipe lines has long been a costly maintenance problem. The solution is an Epon resin coating that stands up to corrosives, that does not flake or peel off, that can be readily applied.

Such an Epon resin-based enamel is now going to work in nearly 300 miles of line for Transcontinental Gas Pipe Line Corp.

It's a *one-coat*, amine-catalyzed system which, cured at atmospheric temperatures, gives the performance of many baked finishes never before obtained with any other cold-cure coating. The Epon resin liner has complete adhesion to metals and extreme resistance to corrosion that keeps gas free of rust and pipe scale.

Paint users recognize the advantage of Epon resin-based formulations: excellent adhesion, resistance to abrasion and impact, ability to withstand a wide range of temperatures, humidity and corrosive atmospheres. Your Shell Chemical salesman will explain how Epon resins can improve your own formulations. Write or telephone for the brochures, "Epon Resins for Surface Coatings" and "Epon Resin Esters for Surface Coatings."

SHELL CHEMICAL CORPORATION

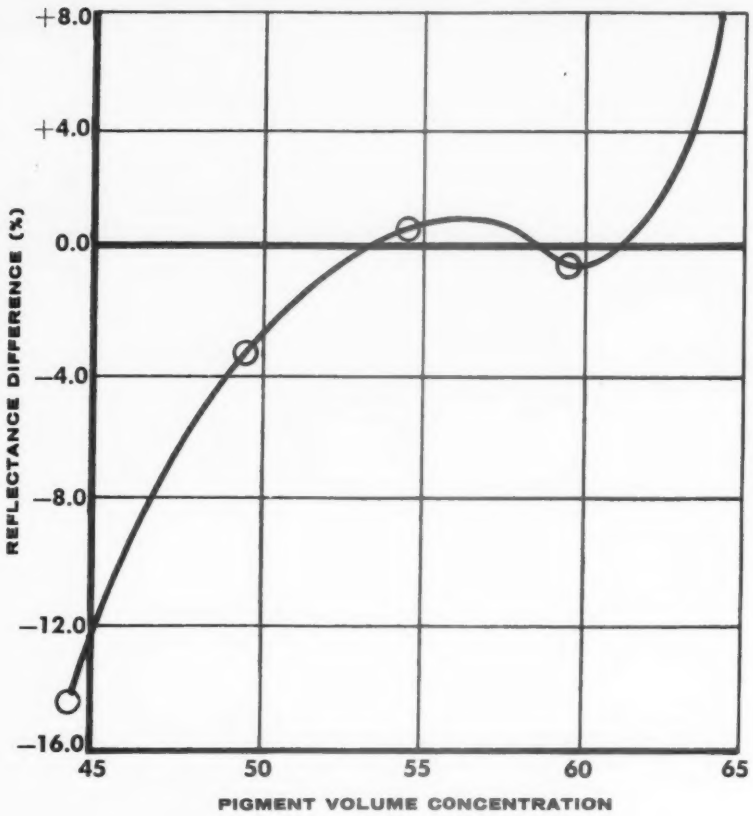
CHEMICAL SALES DIVISION

380 Madison Avenue
New York 17, New York

Atlanta · Boston · Chicago
Cleveland · Detroit · Houston
Los Angeles · Newark · New York
San Francisco · St. Louis

IN CANADA
Chemical Division, Shell Oil Company of Canada, Limited
Toronto · Montreal · Vancouver

Epon resins are the epoxy polymers made exclusively by Shell Chemical Corporation.



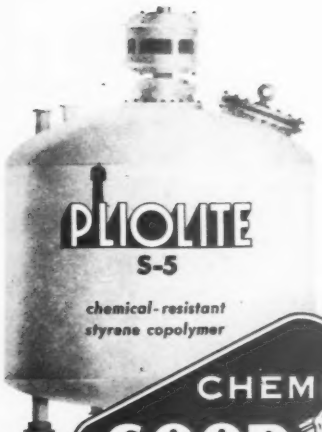
COLOR DIFFERENCE

(Shellac Sealed and Unsealed Asbestos-Cement Board)

S-102-625-PLIOLITE S-5 Deep Tone Gray (w/$CaCO_3$–Mica & Silica)

NOTE: The % difference in reflectance indicates degree to which color of one-coat over sealed surface differs from one-coat over unsealed surface. Plus difference means paint on sealed surface appears darker than one on unsealed portion. Minus value means the opposite and is possible since low PVC paint gives sheen on sealed surface. Study indicates little color difference in range of 52-62 PVC.

A plot to foil mottling!



Mottling is a variation of color brightness, hiding and sheen brought about by the differential penetration, drying and flooding of a flat paint on a substrate of varying porosity. It has long been a too-familiar problem to formulators of masonry finishes.

The chart reproduced above was one of a series plotted by Goodyear paint chemists in studying the causes and cure of mottling. Along with similar plots on permeability, brightness and hiding power, it helped to determine the type and amount of basic pigmentation required to assure color uniformity in paints based on PLIOLITE S-5–first and finest of the styrene copolymers.

As a result of its extensive mottling study, Goodyear now can offer a new series of formulations which have *proved to be nonmottling,* to exhibit all the other established advantages of paints made with PLIOLITE S-5 and to be *extremely low in cost.* For full details, write for the latest *Tech Book Bulletin* to:

Goodyear, Chemical Division, Akron 16, Ohio

CHEMICAL GOODYEAR DIVISION

Coatings Department

Chemigum, Plioflex, Pliolite, Plio-Tuf, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

CHEMIGUM • PLIOFLEX • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS

High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

PAINT and VARNISH Production

(REG. U.S. PATENT OFFICE)

Formerly PAINT and VARNISH PRODUCTION MANAGER
(Established in 1910 as The Paint and Varnish Record)

VOL. 46 APRIL, 1956 NO. 5

NEXT ISSUE

For our May issue we will feature an informative article showing how paint producers are increasingly making use of material handling equipment to facilitate the movement of raw materials during their production phases and in their warehousing operations.

FEATURES

Epoxidation and Uses of Epoxides in Coatings, Part I—Preparation of Epoxy Compounds, *by Dr. Daniel Swern* 27

Lighting for Color Matching, *by W. B. Reese* 32

Instrumental Weighing and Control, *by J. C. Williams, Jr.* 35

Production Tips—Bulk Handling of PVAc Emulsions 39

Report of Southern Production Club Meeting 40

DEPARTMENTS

Comment 7

News 41

New Raw Materials and Equipment 65

Personnel Changes 75

Patents 82

Abstracts 90

Calendar of Events 98

Technical Bulletins 99

Published Monthly by
Powell Magazines, Inc.
Executive and Editorial Offices
855 Ave. of Americas
New York 1, N. Y.
BRyant 9-0499

JOHN POWELL, *Publisher*
ANTHONY ERRICO, *Editor*
MONROE ALTER
Ass't. Editor
A. L. BENDER
Production Manager
WM. R. KELLY
Circulation Manager
PHILIP J. SEAVEY
Advertising Manager
D. P. MACPHERSON
700 S. Washington Sq.
Philadelphia, Pa.
LOmbard 3-9982
JONES & LYNCH
228 N. La Salle St.,
Chicago 1, Ill.
State 2-5096
Advertising Representatives
McDONALD-THOMPSON
West Coast Representatives

MEMBER BUSINESS BPA PUBLICATIONS AUDIT, INC.

PAINT and VARNISH PRODUCTION is published monthly except semi-monthly in February at Easton, Pa. by Powell Magazines, Inc. John Powell, president; Ira P. MacNair, vice-president and treasurer; Alice L. Lynch, secretary. Entered as second class matter at Post Office at Easton, Pa., Jan. 30th, 1952, under the Act of March 3, 1879. Subscription rates: United States and Possessions, $3.00 a year, $5.00 for two years, $10.00 for five years. Single copies 50c each. Canada, $4.00 a year. Pan American Countries, $4.00 a year. All other countries $8.00. Editorial and business office: 855 Avenue of the Americas, New York 1, N. Y. BR-9-0499.

HYDROCARBON PANAREZ RESINS

For your OLEO-RESINOUS VARNISHES AND ALKYDS ...PANAREZ gives you

TOP QUALITY

and Low Cost, too

Definite improvement in chemical and mar resistance of protective finishes is one of the results from use of PANAREZ hydrocarbon resins. Others are improved gloss, improved brushing and leveling while retaining flexibility and adhesion.

PANAREZ resins are neutral, and compatible in oleo-resinous varnishes with phenolics, ester gums, hydrogenated rosins, coumarone-indene and other synthetic resins. Also compatible in most medium and long oil alkyds.

PHYSICAL PROPERTIES

	Color Gardner	Softening Point, °F	Iodine Number	Acid Number
PANAREZ 3-210	9	200-220	230	0-1
PANAREZ 6-210	11	200-220	165	0-1
PANAREZ 7-210	18+	200-220	150	0-1
PANAREZ 8-210	18+	200-220	130	0-1
PANAREZ 9-210	15	200-220	160	0-1
PANAREZ 12-210	16	200-220	60	0-1

We welcome the opportunity to work confidentially with you on your particular problem, and recommend the type of PANAREZ best suited for your needs.

Available promptly in unlimited supply—by the car load, ship load, or individual drums. Warehouses conveniently located in major industrial centers.
SAMPLES FURNISHED WITHOUT OBLIGATION.

PAN AMERICAN CHEMICALS CORP

555 FIFTH AVENUE, NEW YORK 17, N. Y.

PAN AMERICAN CHEMICALS

PANAREZ Hydrocarbon resins • **PANAPOL** Hydrocarbon drying oils • **PANASOL** Aromatic solvents

The Public Must Be Educated

IN an address before the recent convention of the Southern Paint and Varnish Production Club, H. F. Payne of the University of Florida commented on the fact that the lack of understanding and appreciation of paint and paint chemists by the general public is a major cause of the lack of interest in paint technology as a profession by students. Mr. Payne said:

"I am amazed at the large percentage of people who still think of paint in terms of simple mixtures of oil and pigment. Therefore, I believe the Paint Industry must bring to the attention of the general public and high school and college students that modern paint is a very remarkable commodity and not just a simple mixture of color and oil that can be made by any itinerant painter in a vacant garage at the back of a lot. The general public has little or no idea of the complexity of modern paints or of their importance in our economy.

"For example, most people do not realize that paint coatings are no thicker than a few sheets of paper but they are more durable than some metals of equal thickness. Paint not only adds beauty and sales appeal to automobile bodies it also prevents them from becoming rusted beyond use in about a year. Steel ships which are the life line of the commerce across the seas would become unsafe rusty hulks in a short time if they were not painted. I am sure you gentlemen know that beer in tin cans was not practical until a special coating was developed for the inside of the can and that most electrical equipment could not function without insulating coatings. And there are a thousand-and-one other illustrations which could be cited regarding the importance of paint, but does the general public know and appreciate these interesting and important aspects of paint? My opinion is that the public is not sufficiently acquainted with the remarkable properties of modern paint."

In order to remedy the situation, Mr. Payne strongly advocates that the Paint Industry put more effort behind the idea of acquainting the general public and the potential student with the importantce of paint and its many interesting aspects. In order for such an idea to be effective, a continuous campaign must be embarked upon which would require a steady flow of press releases to newspapers and magazines to produce a proper appreciation of the Paint Industry by the general public. With such an approach it is expected that parents would influence their children and students would consider paint to be as glamorous as plastics, synthetic fibers, or electronics.

Supplementing this campaign, Mr. Payne suggests that all those connected with the Paint Industry become a public relations man by telling everyone about new ideas in paints which are being developed almost continuously and how fascinating and important they are.

A most appropriate time for commencing this word-of-mouth campaign, we believe, would be during Chemical Progress Week, which is being observed April 23-28.

Success of such a campaign is very much dependent not only on the complete backing of the technical people of our industry, but that of management as well.

Marbon "9200" ®

Soluble High Styrene Paint Resins

MARBON "9200" for concrete floor enamels can't be matched for fast dry to high hardness; toughness and scuff-resistance; retention of gloss and brightness; excellent water and alkali-resistance; good can stability; and ease of application.

MARBON "9200" HV
for low vehicle solids at higher viscosity

MARBON "9200" MV & LV
for general use

MARBON "9200" LLV
for high vehicle solids at lower viscosity

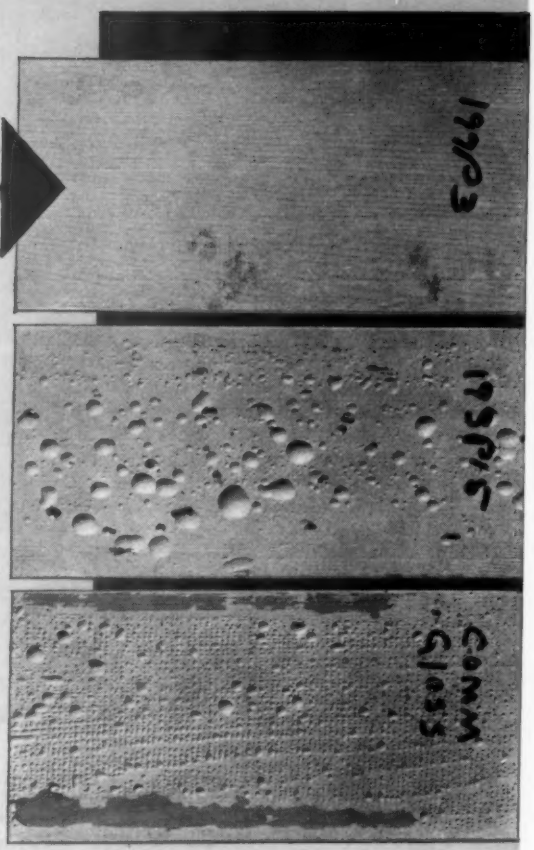
GET THE FACTS — *Write* TODAY FOR TECHNICAL LITERATURE

MARBON CHEMICAL
Division of BORG-WARNER CORPORATION
GARY, INDIANA

MARBON . . . Your Buy-Word for Product Perfection

for house paints that are

BLISTER and STAIN RESISTANT



CYKELIN 70

Comparison of "blister box" tests of paint made with "Cykelin 70", (top panel) and two conventional house paint formulations (lower panels).

You will produce superior blister and stain resistant house paints of the new "breather" type by formulating with Spencer Kellogg's Cykelin 70, pigmented with titanium dioxide and magnesium silicate.

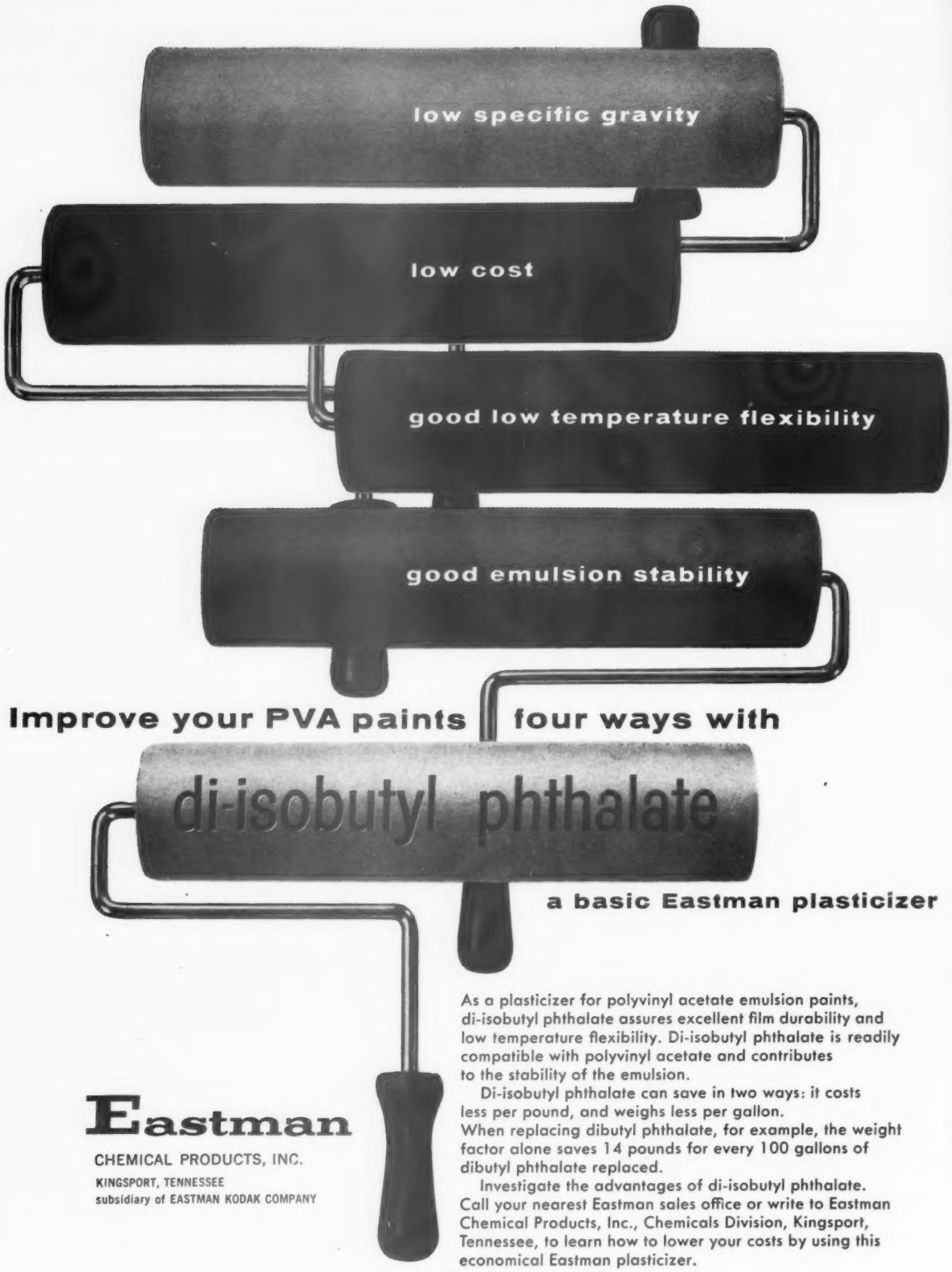
This is a dicyclopentadiene modified linseed oil, specially prepared for this duty providing the harder film necessary for a paint using no lead or zinc pigment.

Samples are available. Write also to the Spencer Kellogg Technical Service Department for descriptive bulletin that includes a suggested formulation.

KELLOGG'S THE TEST TELLS 1894

SPENCER KELLOGG AND SONS, INC.

BUFFALO 5, N. Y.



Improve your PVA paints four ways with

a basic Eastman plasticizer

As a plasticizer for polyvinyl acetate emulsion paints, di-isobutyl phthalate assures excellent film durability and low temperature flexibility. Di-isobutyl phthalate is readily compatible with polyvinyl acetate and contributes to the stability of the emulsion.

Di-isobutyl phthalate can save in two ways: it costs less per pound, and weighs less per gallon. When replacing dibutyl phthalate, for example, the weight factor alone saves 14 pounds for every 100 gallons of dibutyl phthalate replaced.

Investigate the advantages of di-isobutyl phthalate. Call your nearest Eastman sales office or write to Eastman Chemical Products, Inc., Chemicals Division, Kingsport, Tennessee, to learn how to lower your costs by using this economical Eastman plasticizer.

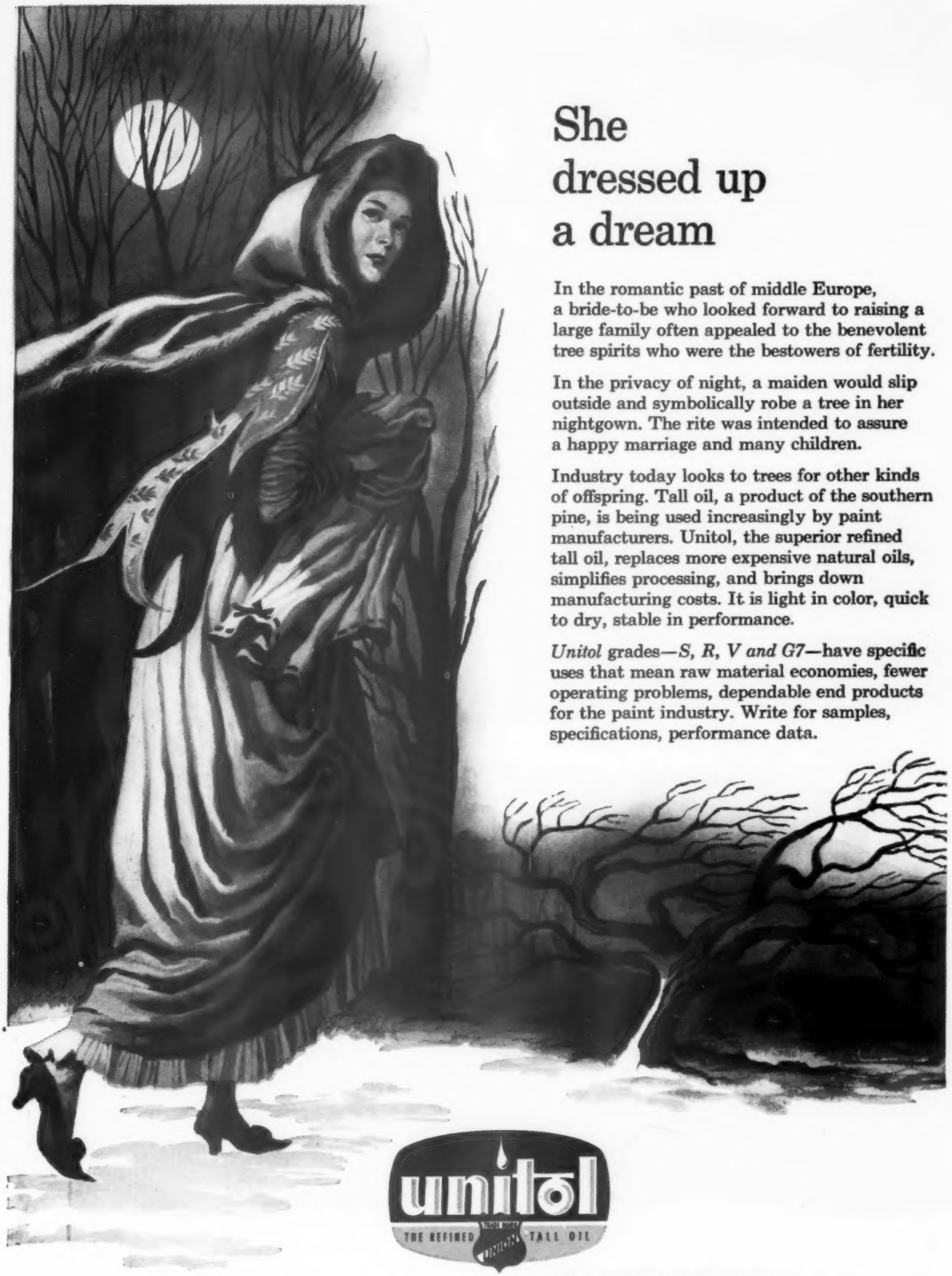
Eastman

CHEMICAL PRODUCTS, INC.

KINGSPORT, TENNESSEE

subsidiary of EASTMAN KODAK COMPANY

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; New York—260 Madison Avenue; Framingham, Mass.—65 Concord Street; Cincinnati—Carew Tower; Cleveland—Terminal Tower Bldg.; Chicago—360 N. Michigan Ave.; St. Louis—Continental Bldg.; Houston—1300 Main Street. **West Coast: Wilson Meyer Co.;** San Francisco—333 Montgomery Street; Los Angeles—4800 District Boulevard; Portland—520 S.W. Sixth Avenue; Salt Lake City—73 S. Main St.; Seattle—821 Second Ave.



She dressed up a dream

In the romantic past of middle Europe, a bride-to-be who looked forward to raising a large family often appealed to the benevolent tree spirits who were the bestowers of fertility.

In the privacy of night, a maiden would slip outside and symbolically robe a tree in her nightgown. The rite was intended to assure a happy marriage and many children.

Industry today looks to trees for other kinds of offspring. Tall oil, a product of the southern pine, is being used increasingly by paint manufacturers. Unitol, the superior refined tall oil, replaces more expensive natural oils, simplifies processing, and brings down manufacturing costs. It is light in color, quick to dry, stable in performance.

Unitol grades—*S, R, V and G7*—have specific uses that mean raw material economies, fewer operating problems, dependable end products for the paint industry. Write for samples, specifications, performance data.

unitol

THE REFINED TALL OIL

Chemical Sales Department

UNION BAG & PAPER CORPORATION

Woolworth Building, New York 7, N. Y.

Hercules

As a running-mate to its new "low-color" Technical PE, Hercules now offers high-purity Mono-PE. Organic as well as inorganic impurities are removed, by an entirely new process. The removal of organic impurities increases the pure Mono-PE content. Removal of inorganic impurities makes it easier to obtain the desired uniformity of properties in your finished products.

High-Purity

Where a pure PE monomer with maximum hydroxyl content is required—for those critical spots in your line—you can't find a more suitable material than this new Hercules Mono-PE. It's dust-free, too. See for yourself what this development can mean to you. Order a trial amount for laboratory or plant-scale test from your nearest Synthetics representative.

Mono-PE

SP56-3

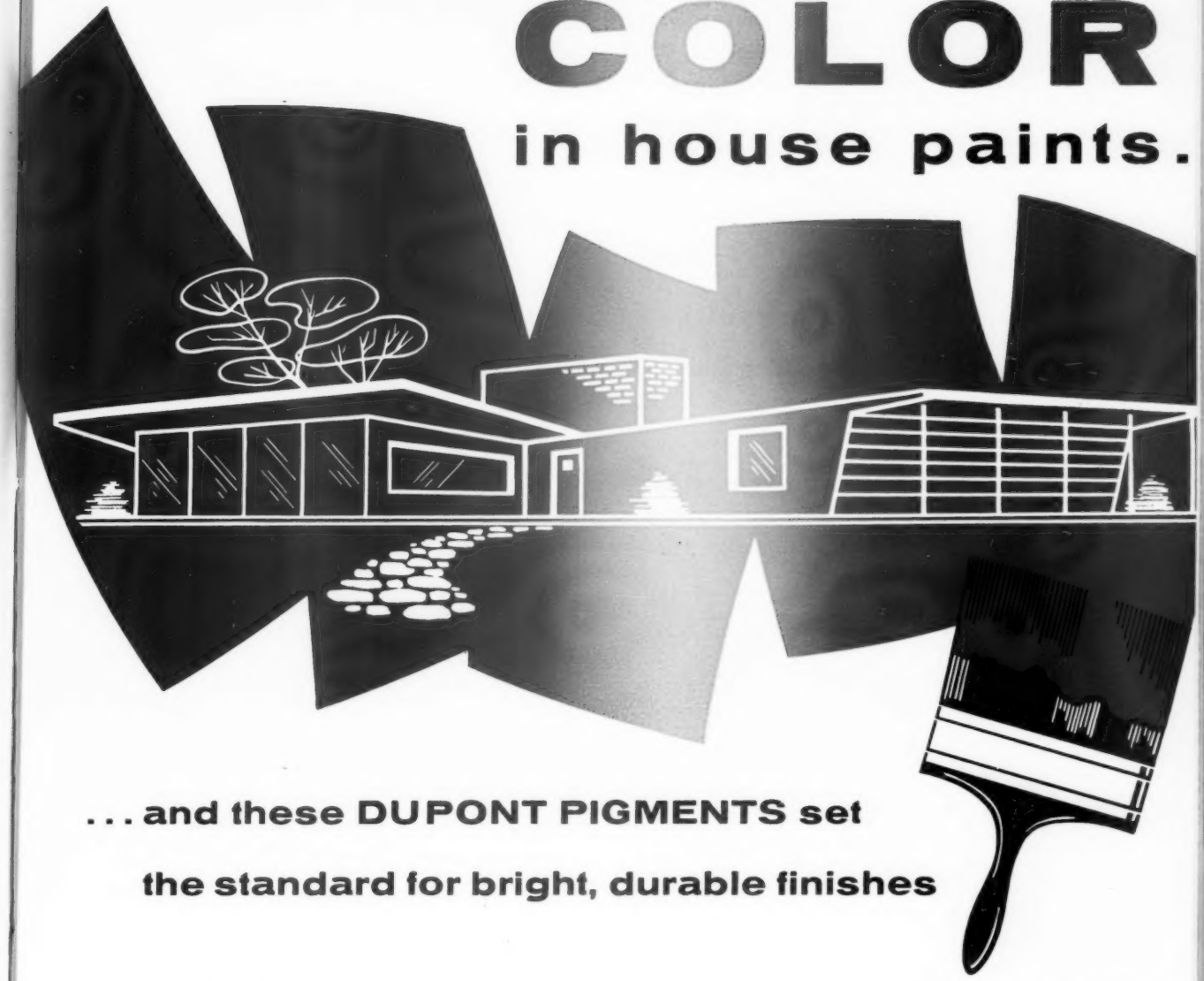
Synthetics Department

HERCULES POWDER COMPANY

INCORPORATED

926 Market St., Wilmington 99, Delaware

the trend is to COLOR in house paints.



. . . and these DUPONT PIGMENTS set the standard for bright, durable finishes

- **Parachlor Red RT-427-D**
- **"Ramapo" Blue FR BP-366-D**
- **"Ramapo" Green GP-755-D**
- **Medium Chrome Yellow Y-469-D**
- **Green Gold YT-562-D**

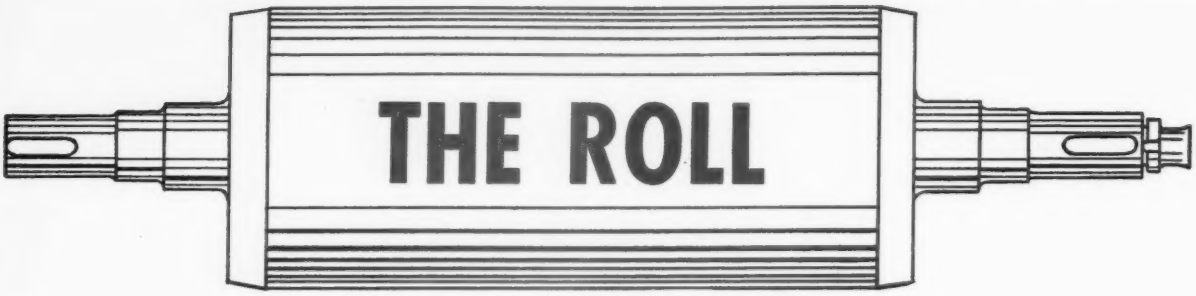
Based on extensive exterior exposure studies these Du Pont pigments have returned exceptional performance in oil-based house paints. When properly formulated, they produce bright, durable colors that are highly resistant to chalk and chemical fade. Your Du Pont salesman will be glad to provide you with detailed information on these outstanding Du Pont pigment colors.

"New Trends in Colored House Paints", a report by W. G. Vannoy of the Pigments Department on Du Pont's work and experience with colored house paints has just been published. Reprints are available on request. Write to E. I. du Pont de Nemours & Co. (Inc.), Pigments Department, Wilmington 98, Delaware, or our District Sales Office nearest you.

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

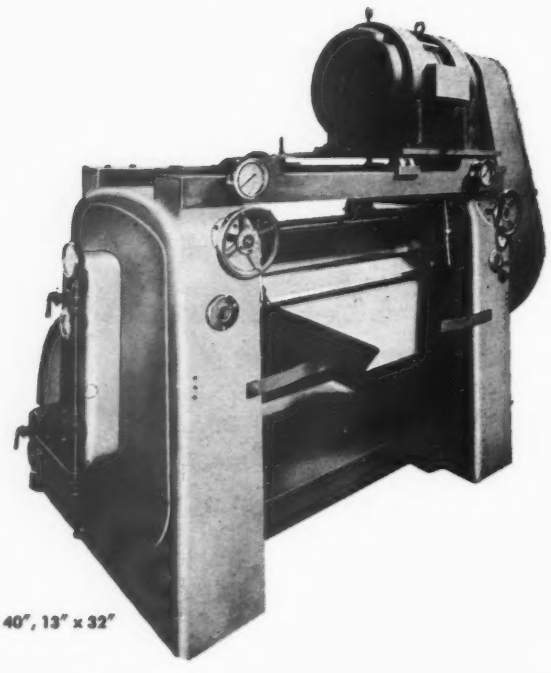
DU PONT
PIGMENTS
FOR PAINTS



IS THE

HEART OF EVERY MILL

Roll Sizes: 16″ x 40″, 13″ x 32″, 9″ x 24″
Float-O-Matic optional



Roll Sizes: 16″ x 40″, 13″ x 32″

Among the many excellent engineering features that distinguish Lehmann Roller Mills, none is more important than the roll itself. Heat transfer, so vitally important to uniform dispersion (roll coverage), has attained an outstanding degree of efficiency in Lehmann Rolls. This is due to design, material, precision machining, and end head construction.

Centrifugal casting provides an extremely tight, dense grain structure with greater uniformity of hardness at the grinding surface. This chilled white iron roll surface is inseparably bonded to a high quality gray iron core, for maximum strength and resilience. The surface of the roll is bevelled at both ends for side shields.

Unique end head construction insures longer roll life, high power transmission and shock resistance.

Sight-O-Matic* provides three-fold gauge control over: dispersion, take off efficiency, product temperature.

The cost-saving features of Lehmann Mills afford the manufacturer new opportunities, in these days of increasing competition. Let us show you what a modern Lehmann Mill can do for you.

*Reg. U. S. Pat. Off.

LEHMANN®

J. M. LEHMANN COMPANY, Inc.

COAST-TO-COAST SERVICE

Moore Dry Dock Company
Oakland, California

Lammert & Mann Co.
Chicago 12, Illinois

J. M. Lehmann Co., Inc.
Lyndhurst, New Jersey

Easy-blending varnishes with BARRETT CUMAR* Resins

These resins are paracoumarone-indene copolymers. They dissolve rapidly in the varnish kettle, tend to retard gelatinization upon standing.

"CUMAR" Resin Varnish films are quick setting . . . have good dielectric properties . . . resist brine, acid and alkalis . . . add valuable properties to PVA emulsions.

Your Barrett representative will provide samples of "CUMAR" Resins and arrange technical assistance. Or write for free "CUMAR" Resin booklet outlining its use in coatings.

Barrett Chemicals for the paint industry

- Phthalic Anhydride
- "CUMAR" Resins
- ELASTEX* Plasticizers
- Maleic Anhydride
- Benzol
- Toluol
- Xylol

CHEMICAL PROGRESS WEEK-APRIL 23-28

Barrett*

BARRETT CHEMICALS

BARRETT DIVISION, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N.Y. In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, P. Q.

OVER 100 YEARS OF EXPERIENCE

Allied Chemical

*Reg. U. S. Pat. Off.

cost-wise...color-wise

YOUR BEST BLACK VALUE!

SUPERBA®

Beads or Uncompressed

There is no black in the medium price range which offers you wider usefulness or better value for enamels, lacquers, and other decorative and protective coatings.

For finishes that SELL... pigment with Superba.

Our Technical Service Department is always ready to cooperate. Write us.

• A COLUMBIAN COLLOID

COLUMBIAN CARBON COMPANY
380 MADISON AVENUE, NEW YORK 17, N. Y.

BRANCH OFFICES AND AGENTS

Akron, Columbian Carbon Co. • **Atlanta,** Chas. L. Burks & Co. • **Boston,** Columbian Carbon Co. • **Chicago,** The Cary Co. • **Dallas,** Roy A. Ribelin Distributing Co. • **Detroit,** Columbian Carbon Co. • **Houston,** Roy A. Ribelin Distributing Co. • **Kansas City, Mo.,** Abner Hood Chemical Co. • **Los Angeles,** Martin, Hoyt & Milne, Inc. • **Louisville,** Wm. B. Tabler Co. • **Minneapolis,** Willard N. Swanson Co. • **New Orleans, La.,** Roy T. Cucullu • **Philadelphia,** Columbian Carbon Co. • **Portland, Ore.,** Martin, Hoyt & Milne, Inc. • **St. Louis,** J. E. Niehaus & Co. • **San Francisco, Seattle,** Martin, Hoyt & Milne, Inc. • **Toronto,** Columbian Carbon Co.

"This job is fun..."

if your odorless paints contain SINCLAIR ODORLESS SOLVENTS

Sinclair Odorless Solvent Light
Distillation Range
IBP . . . 345°F EP. . . 400°F
Kauri-Butanol Value . . . 27

Sinclair Odorless Solvent Heavy
Distillation Range
IBP . . . 375°F EP. . . 465°F
Kauri-Butanol Value . . . 26

Offer her a paint, free of odor . . . an odorless paint formulated with Sinclair Odorless Solvents—and she'll be back for more!

With either of Sinclair's two types of top-quality Odorless Solvents, you can produce a superior odorless paint. For your protection against contamination, Sinclair maintains a fleet of special tank cars, used *exclusively* in Odorless Solvent service. Light and Heavy Odorless Solvents are available in full and split tank car quantities. Prompt shipments to meet your production requirements are assured. For samples, prices and complete information on Sinclair Odorless Solvents, write or call—

SINCLAIR CHEMICALS, INC.

(Subsidiary of Sinclair Oil Corporation)
600 Fifth Avenue, New York 20, New York
Circle 6-3600

G-E GLYPTAL® ALKYD RESINS OFFER

highest quality for uniform end products

Uniform end products depend upon highest quality ingredients. When you're buying alkyds, quality depends largely upon *the experience of your supplier.* That's one reason why General Electric Glyptal alkyd resins are your best buy. General Electric—*first with alkyds*—has developed the 'knack' of quality through years of formulating fine resins. With standards maintained by industry-famous G-E quality control, G-E Glyptal alkyds give you an extremely high-quality product to help you maintain uniform end products.

And there are other important reasons why G-E Glyptal alkyds are your best buy: *expert technical service* from G-E paint specialists . . . *competitive prices* to keep your costs low . . . *nation-wide plants* for convenient service and delivery.

Remember, a G-E specialist is always available to discuss your paint problems. Just write to General Electric Company, Section 6A1D1, Chemical Materials Department, 77 River Rd., Schenectady, N.Y.

Glyptal® alkyd resins "FIRST AT THE FINISH"

Progress Is Our Most Important Product

GENERAL ELECTRIC

Gold-Plated*
Gen-Flo Latex!
* The background of this page is an electron photomicrograph made by a gold shadow-casting technique showing the rubber particles at approximately 50,000 magnification.
CONTROLLED
PARTICLE SIZE
and DISTRIBUTION
assure uniformity
in your latex paints.
Try it.
Samples and
technical bulletins
are available from The
General Tire & Rubber Co.,
Chemical Division,
Akron, Ohio.
Chemical Division
GENERAL
THE GENERAL TIRE & RUBBER CO.
GEN-FLO

HARSHAW
AURASPERSE
COLORS

Service of the largest manufacturer of diversified water-dispersions of colors available for all formulation requirements

EMULSION PAINTS
Polyvinyl Acetate
Styrene-Butadiene
Acrylic

LATEX COMPOUNDS
PAPER COATINGS
LEATHER FINISHES

IMMEDIATE ATTENTION *will be given to your requirements for any aqueous color dispersion of* — Organic or Inorganic Pigment
Oxide or Earth Color
Full Strength or Reduced

FULLY ADJUSTED *to your formulation* — Compatible
Non-flooding
Non-streaking
Economical

Manufactured by ZINSSER & CO., Inc.
SUBSIDIARY OF
THE HARSHAW CHEMICAL CO.
CLEVELAND 6, OHIO

HARSHAW

SAMPLES
and further information will be gladly furnished
ON REQUEST

Branches:
CHICAGO • CINCINNATI • CLEVELAND • DETROIT • HASTINGS-ON-HUDSON • HOUSTON • LOS ANGELES • PHILADELPHIA • PITTSBURGH

From National Aniline's Basic Production...

NATIONAL ASA®
(Anti-Skinning Agent)

NATIONAL
ANTIOXIDANT D*
especially for odorless paints

NATIONAL
ANTIOXIDANT B*

Developed by National Research to cover the entire range of paint, varnish and enamel systems.

All are efficient and economical. As little as 1 to 4 lb. per 100 gal. of paint effectively retards skinning. There is no appreciable effect on drying time.

Write for working samples, specifications and performance data on National Anti-Skinning Agents. Ask particularly for our new TECHNICAL BULLETIN I-18 — ANTIOXIDANT D.

* Trade Mark

NATIONAL ANILINE DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

Boston Providence Charlotte Chicago San Francisco Atlanta Portland, Ore. Greensboro Philadelphia Richmond Cleveland Los Angeles Columbus, Ga. New Orleans Chattanooga Toronto

Allied Chemical

ADVANTAGES FOR ALKYDS . . . WITH

Glycerine

NEW WEATHER RESISTANCE

A new type of weather-resistant alkyd resin—made from isophthalic acid and *Glycerine*—is now being offered in experimental quantities.

The stability and compatibility of Glycerine as a polyol in surface-coating alkyds and its low MW/Hydroxyl ratio, have for years made a wide range of resin properties feasible.

Now Glycerine is combined with isophthalic, a dibasic acid which only recently became available in commercial quantities and which imparts higher viscosity with lower acid number. It also permits higher fatty acid content at workable consistencies. The result: excellent outdoor durability, mildew-resistance and gloss-retention—all demonstrated in a five-year exposure test completed recently. Among 100 alkyd-based enamels tested, an isophthalic-soybean-Glycerine alkyd enamel stood up best.

Here again, ***nothing takes the place of Glycerine.***

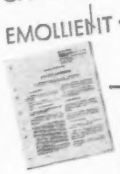
This balanced group of properties keeps **Glycerine's** usefulness growing

HYGROSCOPICITY • STABILITY •
SOLVENT POWER • VISCOSITY • NONVOLATILITY •
NONTOXICITY • TASTE • MW/HYDROXYL RATIO •

HUMECTANT •
CARRIER • SOLVENT • LUBRICANT • SOFTENER •
EMOLLIENT • ANTI-FREEZE • ALKYD BASE

☑ CHECK AND SEND FOR TECHNICAL DATA

☐ 20-page booklet "Glycerine Alkyds Tailored to Need"



☐ 8-page booklet on "Federal Specifications for Glycerine"

☐ 16-page booklet on Glycerine properties and applications

For your free copy of any or all of these booklets write: **GLYCERINE PRODUCERS' ASSOCIATION** • 295 Madison Ave., New York 17, N.Y.

Competition closing in?

....try

Velsicol Hydrocarbon Resins

IF THE inroads of competition are adversely affecting your sales curve, pounding your desk won't help; but a Velsicol Representative will. He'll explain how Velsicol Hydrocarbon Resins have improved the competitive position of many paints and coating vehicles by improving their hardness, flexibility, adhesion and leafing (in aluminum paints). He can suppy samples for test work, and describe the technical services available from the Velsicol Resin Laboratories. Contact him soon. You won't be obligated, but you will be profitably surprised.

VELSICOL

Look for this man!

...your Velsicol Representative, a qualified chemist who can show you how to make better paints and coating vehicles with Velsicol Hydrocarbon Resins.

MAIL THIS COUPON FOR FREE TECHNICAL LITERATURE!

VELSICOL CHEMICAL CORPORATION
300 East Grand Ave., Chicago 11, Illinois Dept. 53
Gentlemen:

☐ Please send me your technical bulletins no. 203 and 219.
☐ Please send me samples of Velsicol Resins.

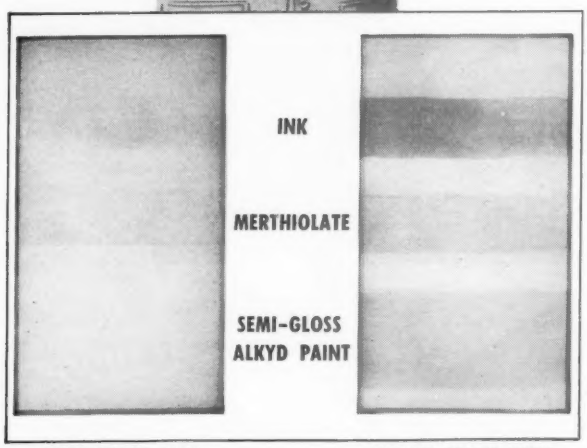
NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE____

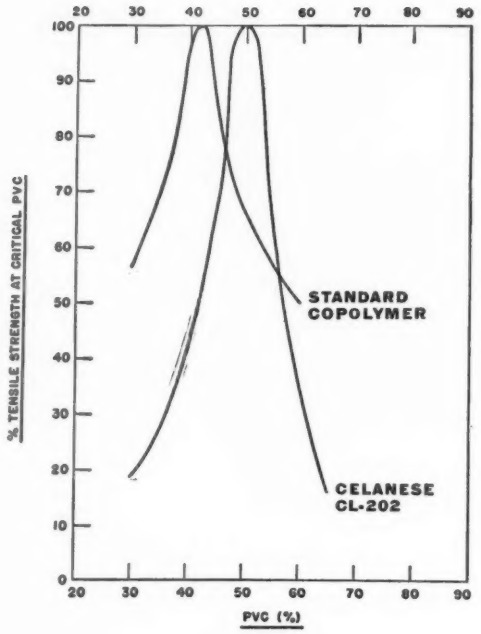
"Don't pigeonhole



PRIMER SEALER WITH CELANESE EMULSION

PRIMER SEALER WITH STANDARD EMULSION

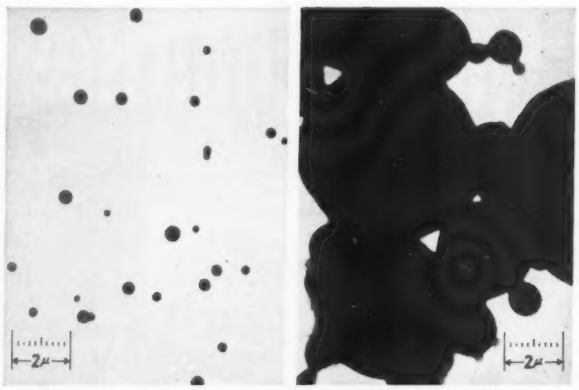
LOW TEMPERATURE COALESCENCE. Pictured above are two primer sealers identical in formulation except for the emulsions used (both homopolymers). These primers were cast (4 mil wet film) at *34° F. on glass* and allowed to *cure overnight at this temperature*. The paints were then stained and photographed from the reverse side of the glass. The primer on the left made with Celanese PVAc exhibited superior film coalescence as evidenced by the sharp reduction in stain penetration.



HIGH PIGMENT BINDING. Celanese emulsions are designed as paint vehicles. Because of this they exhibit extremely high pigment binding capacity. The above graph was prepared by plotting the tensile strength of paint films at progressively higher PVC's. A standard formulation was used and only the emulsions differed. In this comparison (both copolymers) the Celanese emulsion exhibited a critical PVC of 8% above the other copolymer.

CELANESE EMULSION STANDARD EMULSION

SUPERIOR FREEZE-THAW STABILITY. The two emulsions pictured above have been subjected to a standard freeze-thaw stability test (1 cycle = —14° C. for 16 hours, then thaw at room temperature). The Celanese PVAc emulsion at the left successfully passed a repeated freeze-thaw cycle while the one at right coagulated after 1 freeze-thaw cycle.



CELANESE EMULSION STANDARD EMULSION

FINE PARTICLE SIZE. The "inside story" of Celanese improved PVAc emulsions is clearly demonstrated in the above photomicrographs. Fine particle size indicates higher pigment binding, better non-settling, tighter, more closely knit films and better penetration of chalky or porous surfaces when applied at low viscosities.

your plans for PVAc Paint!"

Celanese has a brand new answer

Has your experience with early PVAc emulsions caused you to shelve your vinyl latex paint program?

If so, consider this . . . with new Celanese PVAc emulsions, you can formulate paints with quality unsurpassed by any latex paint, regardless of the *type* or *price* of emulsion used. These are broad claims! . . .

And we can back up these claims because Celanese PVAc emulsions are specifically designed as paint vehicles and represent the latest advances in PVAc emulsion technology . . . advances like these:

Can be formulated at PVC's approaching those of alkyd flats.

Extremely fine particle size.

Superior low-temperature film coalescence—even below 40°F.

Tough, flexible, weather-resistant films.

Superior freeze-thaw stability.

High solids content: 55% ± 1.

Superior pigment wetting ability—extra margin of safety against flocculation difficulties.

Crystal-clear, water-resistant films.

Excellent mechanical stability; can even be milled.

A Celanese technical representative will be happy to discuss these characteristics with you and assist you with any technical problems you have. In addition, Celanese has prepared a manual of standard laboratory tests by which you can determine the properties of any resin emulsion vehicle. You can obtain a copy of this manual along with technical bulletins covering Celanese PVAc paint emulsions by filling out and mailing the coupon below.

What makes the big difference in vinyl latex paints?
The emulsion! And Celanese offers the paint chemist a free manual that shows how to find the big difference in emulsions.

Celanese* plastics and resins

*Reg. U.S. Pat. Off.

Celanese Corporation of America, Plastics Division,
Box 165D 290 Ferry Street, Newark 5, New Jersey

☐ Please send me brochure on Celanese PVAc Emulsions, including test manual.

☐ Please send me samples of Celanese PVAc Homopolymer and Copolymer Emulsions for paints.

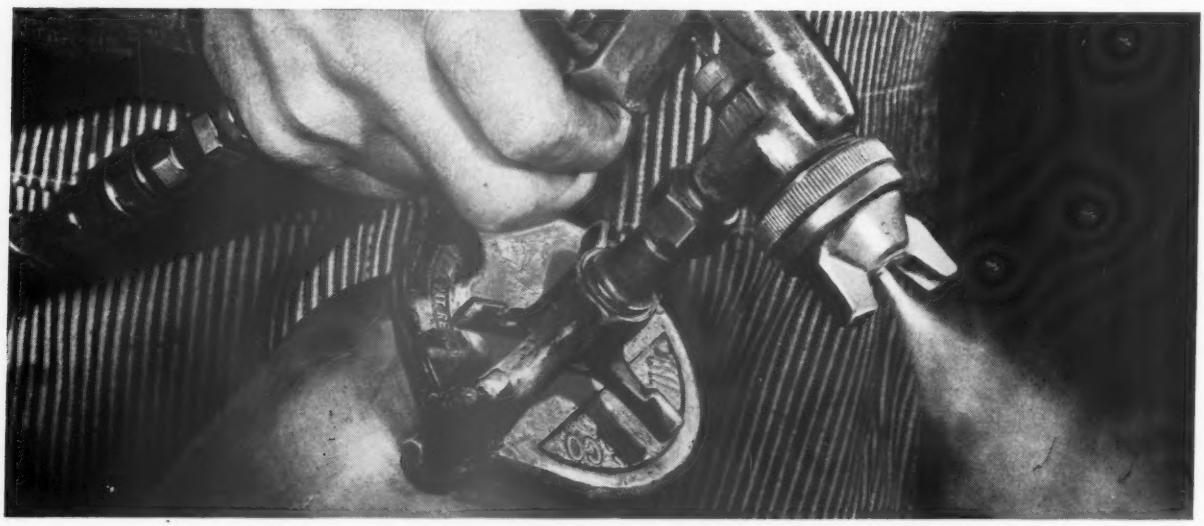
NAME_____

TITLE_____ COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

THE START with your PAINT REMOVER



or THE FINISH with your LACQUER

is better when you manufacture with Enjay Ketones & Solvents

Paint remover and lacquer require uniform, high quality, active solvents to assure best performance. That's why Enjay Methyl Ethyl Ketone and Acetone are in demand by the surface coating industry.

The Enjay Company, a recognized leader in the Ketone and Solvent field, offers you a dependable supply of these high quality materials.

In addition, the Enjay Technical Service Laboratories are available to assist you in the application of all Enjay products. Write or call for complete information.

Enjay offers a diversified line of petrochemicals for industry: KETONES AND SOLVENTS (Methyl Ethyl Ketone, Acetone, Isopropyl Acetate, Secondary Butyl Acetate); and a varied line of LOWER ALCOHOLS, HIGHER OXO ALCOHOLS, OLEFINS AND DIOLEFINS, AROMATICS.

ENJAY

Pioneer in Petrochemicals

ENJAY COMPANY, INC., 15 WEST 51st ST., NEW YORK 19, N. Y.
Other Offices: Akron, Boston, Chicago, Tulsa

EPOXIDATION and USES of EPOXIDES in COATINGS

Part I—Preparation of Epoxy Compounds

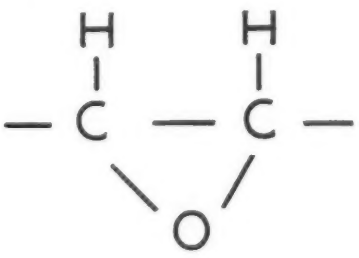
By
Dr. Daniel Swern*

Within the past ten years or so, two new developments have resulted in the large scale utilization of epoxides. One is the commercial preparation of epoxidized oils and esters for use as stabilizers and plasticizers for polyvinyl chloride and other high polymers, and the other is epoxy resins whose growth has been so phenomenal in the surface coatings industry as well as in the preparation of molding, casting and potting compounds.

Technical literature generally descriptive of both developments is scattered and the purpose of this series is to collect and interpret pertinent information.

Part I deals with the methods of preparation of epoxy compounds, particularly the long chain epoxides used as plasticizers and stabilizers for polyvinyl chloride. Also included is a description of methods preparing and utilizing organic peracids. Part II, scheduled for the May number, will consist first of a general discussion of the nature of plasticizers and plasticizer action, followed by a similar description of stabilizers.

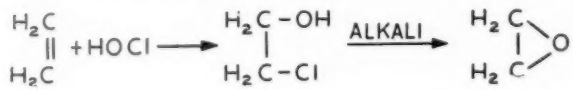
EPOXY compounds are organic compounds which contain the three-membered oxirane ring in the molecule as illustrated:



Numerous methods are available for their preparation but for the purposes of this paper, only those methods will be described which are in commercial use at the present time or might be in the near future.

Hypochlorination-Dehydrohalogenation

This method of preparation is best adapted for the preparation of short chain and volatile epoxides. It is extensively used in the preparation of ethylene oxide and similar epoxides. The process consists in the addition of the elements of hypochlorous acid across the double bond of an unsaturated compound, followed by elimination of the elements of hydrochloric acid by means of alkali, as illustrated:



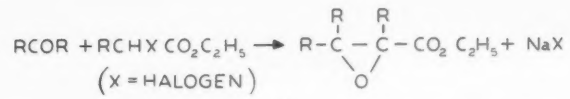
This preparative method is also applicable to the preparation of long chain epoxides but up to the present time no commercial method has been developed because of the poor overall yields of epoxide, even on a laboratory scale. The chlorohydrins can be obtained in substantially quantitative yield, but in large scale preparations the dehydrohalogenation to the epoxide proceeds with difficulty and side reactions occur, so that the overall yield of epoxide rarely exceeds 50%. The development of efficient, continuous dehydrohalogenation procedures would undoubtedly make this process commercially feasible.

Condensation of Aldehydes and Ketones

Epoxy esters in which the epoxide group is adjacent to the ester group can be prepared by the reaction of an aldehyde or ketone with an alpha-halogenated ester in the presence of an alkaline condensing agent,

*Dr. Swern is connected with the Eastern Regional Research Laboratory, United States Department of Agriculture, Philadelphia, Pa.

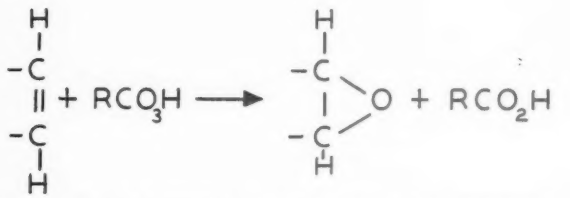
such as sodium ethoxide or sodium amide, as illustrated:



At present this reaction is of academic interest only.

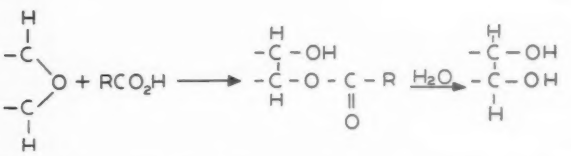
Epoxidation With Organic Peracids

The most important and most widely used method for the preparation of long chain epoxides is the reaction of the corresponding unsaturated compound with organic peracids, such as performic (HCO_3H), peracetic (CH_3CO_3H), perbenzoic ($C_6H_5CO_3H$) and monoperphthalic [$C_6H_4(CO_2H)(CO_3H)$] acid, as illustrated:



The reaction is rapid and substantially complete at or below room temperature, it proceeds in a homogeneous system, the product is easy to isolate and the yields are high.

Depending upon conditions, the reaction may proceed further with cleavage of the epoxide ring to yield hydroxyacyloxy derivatives or glycols, as illustrated:



Generally, mild conditions and the absence of any strong acids are necessary for efficient preparation of epoxides. The ring-opening reaction is shown because this is the most important side reaction which must be minimized in commercial epoxidation with organic peracids.

Use of Preformed Peracids

Perbenzoic and monoperphthalic acids have been used to prepare a large number of epoxides. Although good yields are obtained with either peracid, the necessity of using anhydrous and inert solvents has limited the commercial interest in these peracids.

Early work indicated that peracetic acid could not be used for epoxidation of unsaturated compounds because the products isolated were glycols or hydroxyacetates as already illustrated. Subsequent investigators found that by using relatively short reaction periods and low temperatures, per acetic acid in acetic acid solution could be used for epoxidation of unsaturated substances. It is not surprising that earlier workers obtained little epoxidation because many epoxides when dissolved in an excess of glacial acetic acid are converted completely to hydroxyacetates in a short time at 65-100°C. At room temperature the rate of ring opening in the absence of strong acid catalysts is low. Since peracetic acid solutions in glacial acetic acid generally contain about 1% of sulfuric acid (used as a catalyst in the preparation of the peracid), it is desirable to neutralize this strong acid to obtain the best yields of epoxides. Even under mild conditions, sulfuric acid catalyzes the ring opening reaction of epoxides by acetic acid.

Ease and rate of epoxidation depend on many factors, of which one of the most important is the nature of the unsaturated substance. Epoxidation of isolated double bonds, such as are present in most fatty acids and oils, occurs easily in 2-4 hours whereas epoxidation of terminally unsaturated compounds, such as 1-tetradecene, require over 24 hours with peracetic acid. Time temperature and ratio of reagents effect epoxidation reactions. Reaction of methyl oleate with a 20% excess of peracetic acid in glacial acetic acid requires 1 hour at 45°C, 2 hours at 35°C and 4 hours at 25°C. Essentially identical results are obtained when no excess of peracetic acid is employed.

Performic acid oxidation of unsaturated materials ordinarily gives good yields of the glycol or hydroxyformate and little or no epoxide. Recently, however, performic acid has been used successfully in epoxidation. In this system, it is essential to use minimal quantities of formic acid, 0.25-0.50 mole of formic acid per mole of unsaturation being recommended. Higher ratios of formic acid cause rapid cleavage of the epoxide ring. At least a full molar equivalent of hydrogen peroxide is necessary since the hydrogen peroxide is the source of oxygen required for formation of the epoxide ring. The formic acid serves as the oxygen carrier and, in part, as solvent.

The only organic peracids which have achieved commerical acceptance for epoxidation of long chain fatty compounds are performic and peracetic acids. Peracetic acid is commercially available.

Preparation of Peracetic and Performic Acids

Peracetic Acid: Hydrogen peroxide and acetic acid react to give an equilibrium mixture of peracetic acid, acetic acid, hydrogen peroxide and water, as illustrated:

In the absence of an added catalyst, the rate at which the equilibrium is reached is impractically slow at temperatures up to 40°C. At higher temperatures it is difficult to prevent excessive loss of active oxygen. With sulfuric acid (1%) as a catalyst, equilibrium is reached in about 10 hours at 25°C. Other strong acid catalysts, as well as sulfonic acid type cation exchange resins are also effective. When ion exchange resins are used the peracid produced is free of soluble, strong acids.

The equilibrium constant, K, for this system is determined by the following equation in which the quantities in parentheses are the molar concentrations of the compounds present:

$$K = \frac{(\text{peracetic acid})\,(\text{water})}{(\text{acetic acid})\,(\text{hydrogen peroxide})}$$

If an equilibrium constant of 2.5 is assumed, for the reaction of 50% H_2O_2 with glacial acetic acid 40% of the H_2O_2 would be converted to peracid if equimolar quantities were reacted, and 57% would be converted if 2 moles of acetic acid were reacted with 1 mole of H_2O_2. A 10:1 acetic acid-H_2O_2 ratio would be required for 90% conversion to peracid.

Although the conversion can be improved by replacement of part or all of the acetic acid with acetic anhydride, the use of the anhydride adds the hazards of a more vigorous reaction and the formation of the dangerous acetyl peroxide. Also, the higher the concentration of H_2O_2 the greater is the yield of peracetic acid. When the H_2O_2 concentration exceeds 65%, however, special caution should be used to avoid the formation of easily exploded mixtures.

Typical preparative methods are:

(1) To 100 grams of glacial acetic acid containing 1.5% sulfuric acid, 25 grams of 30% H_2O_2 is added. The conversion to peracetic acid is 77% after 16 hours at 25°C.

(2) To 4500 grams of glacial acetic acid containing 63 grams of concentrated sulfuric acid, 1890 grams of 90% H_2O_2 is slowly added. At the end of one hour, 6343 grams of acetic anhydride is added slowly to the reaction mixture with temperature maintained at 35-40°C by external cooling. The yield of peracetic acid is 95-98%.

(3) A well-stirred mixture consisting of 4500 grams of acetic anhydride and 1000 grams of 30% H_2O_2 is maintained at 40°C with external cooling for four hours, then allowed to stand overnight at room temperature. The yeild of peracetic acid is 80-90%.

(All procedures given in this series of articles are intended to be illustrative only and should not be considered recommendations of preferred procedures. The use of hydrogen peroxide and organic peracids is accompanied by some hazard and specific information regarding any particular type of procedure should be obtained from the appropriate manufacturer before chemical reactions are carried out. All preparations of and reactions with organic peracids should be conducted behind safety shields. Provision should also be made for rapid cooling and dumping of the reaction mixture if necessary.)

Performic Acid: Reaction of H_2O_2 with formic acid is also an equilibrium reaction. The equilibrium constant, K, appears to be about half the value obtained for equivalent molar concentrations of acetic acid. Although the equilibrium is less favorable to performic acid, the attainment of equilibrium is more rapid than in the peracetic acid system. No mineral acid is needed to catalyze peracid formation. Performic acid, which is less stable than peracetic acid, is best prepared and used *in situ* in the epoxidation reaction as described later.

Advantages of Hydrogen Peroxide or Peracids

Hydrogen peroxide and organic peracids have many advantages in organic oxidation reactions, particularly epoxidation. Some of the desirable characteristics are:

High Reaction Efficiency
Often Quantitive Yields
High Reaction Specificity
Product Isolation Easy
Products of Low Residual Unsaturation Readily Attainable
Minimum By-product Formation
Approximately Stoichiometric Quantities of Hydrogen Peroxide or Peracids Required
Absence of Metallic or Other Contamination
General Solubility in the Reaction Medium
Applicability to Aqueous and Nonaqueous Systems
Applicability to Homogeneous and Heterogeneous Systems
Recovery of Organic Acids for Reuse if Desired
Applicability to Standard Type Process Equipment (Glass-lined or 310 Stainless)

Epoxidation with Preformed Peracids

Peracetic Acid Epoxidation of Methyl Oleate: To 200 grams of peracetic acid solution (prepared from glacial acetic acid and 30% H_2O_2) containing 0.255 mole of peracetic acid, 12.5 grams of sodium acetate trihydrate is added to neutralize the sulfuric acid used as a catalyst in the preparation. Technical methyl oleate (0.212 mole), iodine number 85.5, is added and the reaction mixture is vigorously agitated at 35°C for two hours. The reaction mixture is poured into water equal in weight to the glacial acetic acid in the peracetic acid solution. The product, which separates quantitatively, is washed free of acidity and dried. The product contains 4.0% epoxy oxygen and has an iodine value of 8.

Peracetic Acid Epoxidation of Butyl Oleate: To 100 grams of distilled butyl oleate (0.29 mole), iodine number 74, in a three-necked flask equipped with a reflux condenser, thermometer and mechanical stirrer, 2.8 grams of anhydrous sodium acetate is added. The mixture is cooled to 20°C and 57.3 grams (0.302 mole) of commercial 40% peracetic acid is slowly added over one hour at a controlled temperature of 20-25°C. Approximately 1/3 of the peracid is added during the first half hour and the balance is added during the second. During the addition of peracid, a temperature rise is observed after each increment. In this way peracid buildup is avoided and the reaction proceeds apace with peracid addition. The reaction mixture is continuously stirred at 25°C until periodic titration (discussed later) of the mixture indicates that 80% of the peracetic acid has been consumed. This requires an additional 2 hours. The reaction mixture is then warmed to 50-60°C for 1 hour. The product is isolated by transferring the reaction mixture to a separatory funnel, drawing off the lower aqueous layer and successively washing the oil layer with warm water until free of acid. The oil is dried and analyzed. The product contains 4.3% epoxy oxygen and has an iodine value of 1.5

In Situ Epoxidation Procedures

The preparation of long chain epoxides by the reaction of the corresponding unsaturated compounds with organic peracids assumed practical importance only within the past five years with the development

of *in situ* techniques for preparing and using up performic and peracetic acids as they are formed. The separate preparation and handling of peracids is time-consuming, it can be hazardous (particularly with concentrated performic acid), and significant loss of active oxygen may occur. Since, as already shown, the preparation of peracids is an equilibrium, it is possible to avoid their separate preparation by conducting the reaction of hydrogen peroxide with the aliphatic acid in the presence of the unsaturated compound to be epoxidized.

By operating in this way losses of active oxygen are kept at a minimum and the hydrogen peroxide can be efficiently utilized. The only epoxidation techniques which have achieved any large scale commercial importance are the *in situ* ones, using hydrogen peroxide with either formic acid or acetic acid as the oxygen carrier.

Rapid formation and consumption of peracid must take place in the *in situ* techniques. With hydrogen peroxide and formic acid, this is no problem even with small ratios of formic acid (0.25-0.5 mole per mole of unsaturation) and in the absence of added acid catalysts. With hydrogen peroxide and acetic acid, however, acid catalysts are needed to speed up peracid formation. The usual catalysts are sulfuric acid and polystyrene sulfonic acid cation exchange resins With sulfuric acid, cleavage of the oxirane ring is also speeded up unless the acetic acid content is low and short reaction times are employed. The use of an inert organic solvent also diminishes undesirable side reactions.

The use of ion exchange resins which speed up peracetic acid formation without causing undue ring opening is a fairly recent development. In the first reports, large quantities of ion exchange resin (25% of the combined weight of the unsaturated compound plus acetic acid) were required, thus making the process unattractive commercially. Subsequently it was shown that the resin could be used 8-10 times, but problems in handling the swollen, easily fractured resin in the batch processes which were available made the procedure difficult to operate on a large scale. Recently, a modified procedure has been described in which about 2% of ion exchange resin is employed and discadred after one use.

Performic Acid Epoxidation of Methyl Oleate: In a vessel equipped with a mechanical stirrer, thermometer, and dropping funnel, 592 grams (2 moles) of methyl oleate and 34 grams (0.66 mole) of 90% formic acid are placed. While the mixture is stirred, 136 grams (2 moles) of 50% H_2O_2 are added slowly at 25-28°C. The temperature is maintained in that range by the use of a cooling bath. After complete addition of the H_2O_2, the temperature is allowed to rise to about 40°C where it is held by cooling. The reaction mixture is stirred at 30-40°C for 24 hours, after which the oily layer is separated from the aqueous layer. The oily layer is washed first with a saturated aqueous solution of sodium bicarbonate and then with water. After the oil has been dried at 100°C under vacuum, there is obtained 611 grams of light yellow product which contains 3.48% epoxy oxygen.

Peracetic Acid Epoxidation of Soybean Oil (Reusable Ion Exchange Resin Catalyst): In a vessel equipped with a mechanical stirrer, thermometer and dropping funnel are placed 200 grams of soybean oil, iodine number 135 (equivalent to 1.06 moles of double bond), 33 grams of glacial acetic acid and 28.1 grams of sulfonic acid ion exchange resin (Amberlite IR-120, Duolite C-25, Dowex 50X, Permutit Q or other equivalent resins). The mixture is heated to about 60°C and 79.5 grams of 50% H_2O_2(1.17 moles) are slowly added over a period of several hours. The temperature is then raised to 60-65°C and maintained at this temperature until the reaction is complete, as determined by periodic titrations of the reaction mixture for unreacted hydrogen peroxide. After about 5-6 hours, the resin is filtered off. The product is isolated by addition of water to cause the oil to separate as an upper layer followed by washing with successive portions of water to remove the residual acetic acid. After the oil has been dried, there is obtained a light yellow viscous product which contains 6.5% epoxy oxygen. The resin may be used several times with little diminution in catalytic activity.

The sulfonic acid ion exchange resins are available in various forms. They may be obtained in the sodium or hydrogen form, wet or dry. Before use they must be regenerated, if necessary, to the hydrogen form. The catalyst concentrations are calculated on a dry weight basis. It is recommended that residual water be removed under vacuum or by elution with glacial acetic acid. In either case, the resin is best conditioned before use with acetic acid.

Peracetic Acid Epoxidation of Soybean Oil (Expendable Ion Exchange Resin Catalyst): The procedure just described is repeated except that 2.24 grams of resin catalyst is used instead of the larger quantity, and the temperature of heating after the H_2O_2 is added is 75-80°C. The reaction is complete in about 7-8 hours. Since minimum quantities of resin are used, it is discarded.

Methods of Analysis

Hydrogen Peroxide and Peracetic Acid: Hydrogen peroxide is most readily analyzed by titration with potassium permanganate or ceric sulfate. Peracetic acid in the presence of hydrogen peroxide may be determined by the following procedure. This is equally applicable to the epoxidation reaction mixture itself.

Reagents: Ceric sulfate (ammonium tetrasulfatocerate) 0.1 N in 0.05 N sulfuric acid. Potassium iodide solution, 10%. Sodium thiosulfate, 0.1 N Ferroin indicator (o-phenanthroline-ferrous ion).

Procedure: The sample of peracid is weighed accurately and placed in a 500 ml. Erlenmeyer flask containing 150 ml. of 5% sulfuric acid and sufficient cracked ice to maintain a temperature of 0-10°C. An adequate sample is chosen, if possible, to consume approximately 40 ml. of 0.1 N thiosulfate. Three drops of ferroin indicator are added and the flask contents are titrated with 0.1 N ceric sulfate to the disappearance of the salmon color of the indicator. Ten ml. of the 10% potassium iodide solution are then added and the liberated iodine is titrated with 0.1N sodium thiosulfate. Starch indicator is added near the end point for the thiosulfate titration.

Calculations:

$$\% H_2O_2 = \frac{\text{ml. of ceric sulfate} \times N \times 17}{10 \times \text{sample weight}}$$

$$\% \text{ Peracid} = \frac{\text{ml. of sodium thiosulfate} \times N \times \text{equivalent weight of peracid}}{10 \times \text{sample weight}}$$

$$\% \text{ Total Active Oxygen} = \frac{(\text{ml. of ceric sulfate} \times N) + (\text{ml. of thiosulfate} \times N) \times 8}{10 \times \text{sample weight}}$$

This method may be used with minor modifications to titrate samples of the reaction mixture when following the course of epoxidation reactions.

Epoxy Oxygen

Epoxy oxygen can be determined by utilizing ether-HCl, dioxane-HCl, or pyridine-HCl. The last procedure has been adopted as a tentative method by the *American Oil Chemists' Society*, and is given below. The method is based on measurement of HCl consumed in opening the oxirane ring. The HCl is supplied as the acid salt of pyridine. The reaction is carried out at reflux temperature.

Reagents: HCl in pyridine (pyridine hydrochloride), 0.2 N. Sodium hydroxide, 0.2 N. Phenolphthalein indicator, 1% in methyl alcohol. Neutralized methyl alcohol.

Procedure: Weigh about 0.001 mole of sample into a 250 ml. flask, and pipette in exactly 25 ml. of the pyridine-HCl reagent. Reflux for 30 minutes, cool, wash down condenser with 50 ml. of neutral methyl alcohol and titrate with 0.1 N sodium hydroxide to the phenolphthalein end point. Run a blank, and when necessary, determine the acid equivalent of the sample.

Calculations:

$$\frac{(A + B - C) \times N \times 0.016 \times 100}{\text{Sample Weight}} = \% \text{ Epoxy Oxygen}$$

where A is ml. required for blank
B is ml. required for free acid present, calculated to same weight of sample
C is ml. required for sample

Epoxidation Process Notes

Catalysts: Generally it will be found that strong acid catalysts are readily interchangeable. In the case of monounsaturated fatty acid esters, equivalent results will be obtained with sulfuric acid, alkanesulfonic acid, or sulfonic acid type cation exchange resins. Where polyunsaturated fatty acid esters are being epoxidized, it will be found that ion exchange resin catalysts give higher conversions to epoxide than do the corresponding sulfuric acid or alkanesulfonic acid catalysts.

Solvents: Solvents will be found beneficial, particularly where sulfuric acid or alkanesulfonic acid catalysts are being employed. Aliphatic solvents, such as hexane or heptane, and aromatic solvents, such as benzene, toluene or xylene, are recommended. Generally, 20% solvent on the weight of unsaturated material will be found beneficial in repressing secondary and unwanted ring opening of epoxide. Higher conversions to epoxide can be realized in many cases when solvents are employed. Where solvents are used close to their reflux temperature, they provide an auxiliary benefit as a heat reservoir for the exothermic reaction. Additionally, they facilitate washing and drying the epoxy product. Epoxidation reactions utilizing ion-exchange resin catalysts generally do not necessitate the use of solvent, but there may be instances where solvent is beneficial.

Temperatures: Reaction temperatures of 60-80°C, depending upon the catalyst system, are often employed. Lower temperatures give longer reaction times with possibly poorer conversions to epoxide. Higher temperatures have also been utilized but shorter times are then employed. In general, greatly accelerated reactions can be achieved but at a sacrifice of epoxy conversions.

Molar Ratio of Acid To Hydrogen Peroxide: Generally 0.25-1.0 mole ratio of acetic or formic acid to hydrogen peroxide is employed. Optimum results are obtained at approximately 0.5 mole of acetic acid or 0.25 mole of formic acid to 1.0 mole of H_2O_2. Higher molar ratios may speed up the reactions but generally result in greater ring opening.

The acid requirements are sufficiently small to allow discard of the diluted acid at the end of the reaction. For large scale applications, however, where acid recovery may be desirable, the processes described allow recovery of the acid, with slight modification. Prior to recovery by distillation residual peroxides in the dilute acid must be destroyed by the addition of suitable reducing agents.

Heat of Reaction: Heat of reaction for the epoxidation of a double bond is about 60 kcal. per mole.

Safety Considerations

In common with all peroxides, hydrogen peroxide and organic peracids are thermodynamically unstable and subject to decomposition by contaminants even in small amounts. The decomposition reaction is exothermic and gives rise to large volumes of gas. With due attention to simple safety precautions dictated by these properties, no difficulty should be encountered in handling hydrogen peroxide and organic peracids. These materials have been employed in large scale organic reactions for some years. For general safety and handling considerations in the use of hydrogen peroxide and organic peracids, particularly performic acid and concentrated hydrogen peroxide, a potential user should consult manufacturers of peroxides.

Where hydrogen peroxide or an organic peracid is to be employed as an oxidant for an organic reaction, consideration must be given to the potential impact sensitivity of specific mixtures. Hydrogen peroxide forms potentially detonatable mixtures with organic materials in well-defined hydrogen peroxide concentration ranges. Such information has been published. Generally the sensitive region is one of high

(*Turn to page 97*)

LIGHTING FOR COLOR MATCHING

By
W. B. Reese*

ONE does not have to look very far in the homes and businesses of America to see the color revolution that has taken place in the color styling and color design of home appliances, office partitions, and other building materials employing porcelain enamel and paint. As a result, problems relating to color matching, color and color harmony have become most important. Those of you who must struggle daily with the control of color can appreciate the difficulty which is associated with color matching, for many times you have been asked to produce a particular color which matches a plastic, rubber, or paint color where these different materials are used on the same appliance or device. Not only do these materials differ in texture, but the pigments which are used are basically different and, as a result, it oftentimes is not possible to obtain a perfect match, especially under more than one illuminant. Furthermore, you have been expected to watch closely certain industrial trade or brand colors. Your constant contact with these problems would logically raise in your mind the question, "What are the conditions which define a satisfactory commercial color match?"

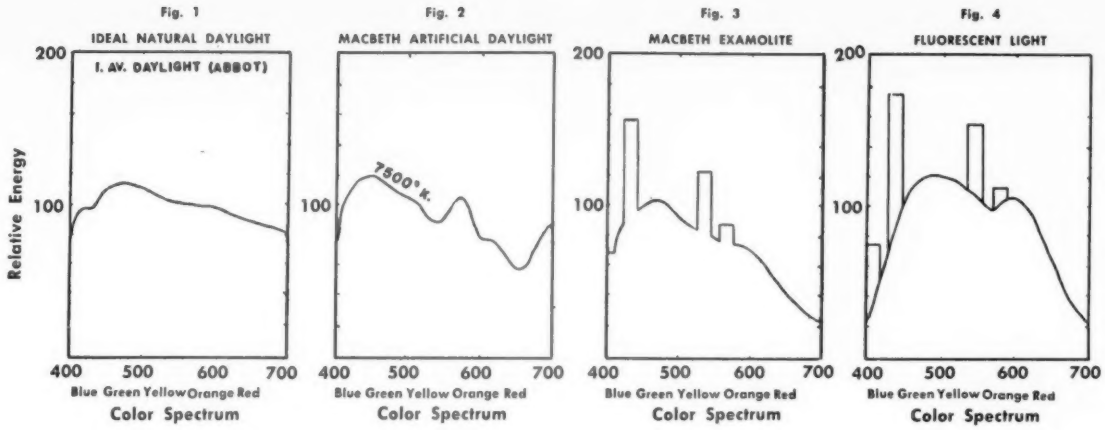
Perhaps you will enjoy what seems to be a universally accepted non-scientific definition which is simply stated as being, "that which one can get away with". Logically the laws of supply and demand, price, delivery, and the color sense of the customer all play an important part in determining when a particular color is approved. The customer must always be able to recognize satisfactory colors in view of limitations imposed by inadequate colorants or other variable factors inherent in the manufacturing process. Customer experience and education are the only means by which this understanding can be obtained. Our economy has been referred to as a "boom". However, it is a peacetime boom and highly competitive and, as a result, high product quality requirements including color, are demanded by the customer.

The above unit is said to provide filtered incandescent illumination accurately reproducing ideal quality of North Sky Daylight 24 hours per day over a large working area.

Color—Complex Subject

We can all agree that color is a complex subject and can be simultaneously objective as well as subjective. The other speakers have dealt principally with the objective side of color including color control systems, color measurements, as well as color order systems. On the other hand, practical everyday color matching is basically subjective. The dictionary defines the word *subjective* as "that which exists in the mind and belongs to the thinking subject

*Mr. W. B. Reese is connected with the Macbeth Daylighting Corp., subsidiary of the Macbeth Corp., Newburgh, N. Y. This article is based on a paper presented by Mr. Reese before the 17th Annual Shop Practice Forum of the Porcelain Enamel Institute, Columbus, Ohio, Sept. 14-16, 1955.



Curves showing the relationship of various light sources and indicating similarity of artificial lighting to the quality of ideal natural daylight.

rather than to the object of thought". There can be no question that a color matcher's function is indeed subjective, for certainly his intimate knowledge of the production process variables and the proper use of pigments or colorants exist in his mind and are based upon long past color experience. The color matcher has relied on his educated eyes for years and has had to observe the color differences between the match and the standard. These visual color differences have been translated by the color matcher into the proper corrective action to be taken in order to achieve a better match. It has been said that death and taxes are the only two things in this world that are certain. If we include color, there may be a third, as it is certain that whenever supplier and purchaser get together on a color, a pair of human eyes will make the final color judgment, which color judgment is likewise subjective. At this point, it would be well to investigate what special lighting has to do with subjective color matching.

Light Sources

Imagine a light demonstration unit consisting of three light sources, each individually installed in its own compartment. This unit will allow us to operate the three light sources simultaneously and to observe how each light affects the same colors. The three light sources are commonly encountered in everyday living and working are:

(1) Artificial North Sky Daylight
(2) Incandescent Light
(3) Cool White Fluorescent

We have prepared three identical color panels with most of the hues present, and it is interesting to see how greatly different each of these identical panels appear when we place one under each of the three light sources and view all three at the same time. It should be emphasized that the color difference which you see is due to the light sources themselves and that the color change does not occur in the panels except as a result of the color difference in the lights. From this astonishing change, we can draw a simple conclusion: "Color is not only how you see it, but also how you light it!" The physicist and illuminating engineer can scientifically explain how these changes occur but for those of us concerned with color matching, while we would find the explanation interesting, we would be rather more concerned with how this type of color change can or does affect the art of color matching.

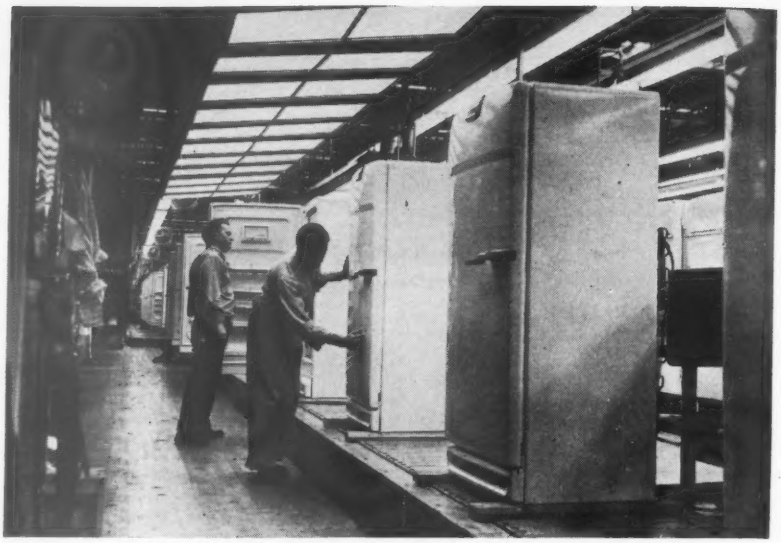
Color Matching—Subjective

It was mentioned earlier that color matching is subjective and that a color matcher, acting subjectively, performs a function in his mind which involves the recognition of color differences and the interpretation or translation of these differences into the proper corrective action. We might think of this in another way which perhaps might oversimplify this subjective process, but which will more easily permit this thought to be developed further. Imagine that a color matcher's mind is analogous to an electronic computer with many memory circuits in which information has been stored away over the years as various color experiences were encountered. The color matcher's eyes, when exposed to a particular color difference, generate and send a signal to the computer so that the proper memory circuit will be energized in order to obtain the correct color information. Bear in mind that this memory circuit got its information in the first place as a result of the color matcher's earlier successful experience with a similar color problem. If the wrong signal is generated and forwarded to the electronic computer, we are in trouble, and several attempts will have to be made before success is achieved, if at all. Let us examine the signal as this would appear to be the bridge or connecting link between the eyes and the electronic computer. The origin of the signal is found in the simple statement made earlier which said that the color matcher *observed* a certain color difference. In order to make this observation, it was necessary for the color matcher to have illumination on the objects which he is attempting to match and that the color differences which he detects with his eyes are not only dependent upon the absolute color differences between the two samples but is, also, a direct function of the

type of illumination used. We have shown with the light demonstration unit earlier that the same colors will appear greatly different under different types of illumination; hence, it is understandable how it might be possible to send the wrong signal to the electronic computer because of erroneous impressions of color differences which could be created by improper illumination

We cannot penalize the human eye for reacting to differences in illumination resulting in an incorrect answer. We can, however, take steps to do something about the illumination to avoid sending the wrong signal by permitting the eye to detect and interpret the color differences properly. It would also be wise to have a check on the correctness of the answers given by the electronic computer. In the case of acutal electronic computers, a problem whose answer is known is fed to the computer in order to check to be sure that the computer is operating properly. In the instance of color matching, we can likewise double check our answers to make sure that we have the right one by using a second illuminant. All color matchers know that it does not follow that a color which matches under daylight, for example, will continue to match under a different illuminant. It is, therefore, wise to check the match under a second illuminant which is greatly different from daylight to make sure that the computer has functioned properly and has given a color answer which will hold up under the widest possible lighting conditions. We are, of course, referring to those colors which are technically called metamers. Metameric matches frequently occur especially where colors are being matched to a standard whose pigments or formulations are unknown or where the standard itself may be composed of a completely different material.

Since the importance of the illunimation used by color matchers has been established, the lighting conditions which are required for this important work should be clearly defined. Again, this can only be determined with a subjective approach by observing past practices of color matchers in your industry, including textiles, plastics, printing ink, etc. Traditionally, the color matcher has sought his north window and has come to lean upon this source of illumination as his bench mark from which color judgments are made. In other words, these are the conditions under which the information has been supplied to the color memory circuit. Man is an excellent observer of "effect", but knows little about "cause". In the case of the preference for the north window, it is interesting to note that the color matcher has been indeed intuitively correct as the light from the north window in this hemisphere is the least variable from that which comes from any other quadrant of the sky; hence, a desire for constancy. Natural north sky daylight when analyzed by the physicist turns out to be rich in all of the colors present in the entire visible spectrum; hence, a desire for illumination which will not distort color due to lighting color deficiencies since we could not see color differences unless the hue of the color difference is present in the light source to start with. For example, two red samples which are different from each other, viewed under a light source totally deficient in red would appear to be shades of gray and their chromatic differences would be impossible to visually detect under this kind of light source. The color matcher usually does his work at the north window from mid-morning to mid-afternoon; hence, a desire for relatively high intensity.



A bank of "Examolites" used in the color quality inspection of Frigidaire refrigerators as they come off the assembly line.

Features of Artificial Light

From these observations of effect, we can conclude that a proper artificial light source for color matching should incorporate features of constancy, relatively high intensity, and complete color content. This conclusion is based upon the color matcher's preference and the beliefs by which he obtained his past color experience. Artificial north sky daylight lamps have been designed which meet these three requirements, plus the additional advantage of a second illuminant for purposes of detecting metameric matches. It is logical that the time to detect a metameric match is when the color is being formulated. There are several advantages to be gained from the use of proper artificial daylight illumination for color matching. The obvious advantage is availability 24 hours a day and elimination of the necessity for dependence upon natural daylight which is subject to change due to weather conditions, time of day, and geographical location. Equally important, however, is the fact that the possibility of sending an erroneous signal to the color matcher's reservoir of information by allowing him to use his eyes under a light source which renders color differences without distortion has been removed. In addition, the color matcher has been provided

(*Turn to page 96*)

INSTRUMENTAL WEIGHING AND CONTROL

Modern automatic weighing systems serve to reduce human error, speed up production, and provide greater product uniformity.

By
J. C. Williams, Jr.*

MODERN process industries have long depended upon batch weighing as a means for controlling quality and uniformity of product. The need to keep man hours per unit produced to a minimum has led to the design of various types of automatic and semi-automatic weighing systems. In the past, these systems have usually used beam scales and have depended upon mercury or micro switches and photo-cells to provide the desired switching sequences. These systems are ordinarily of the single or multiple batch type, where the weight of one or more ingredients is automatically weighed and dumped.

The development of the versatile load cell has given today's engineer great latitude in designing automatic weighing systems. This has led to the increased application of instrumental weighing. This latitude of design is most important when remote indication and control is necessary or desirable, or where additional control functions are to be integrated into a single control system to reduce human error, speed up production, and provide greater uniformity of product.

Any weighing system can be divided into four parts, namely;

(a) Load Sensing
(b) Indicating
(c) Controlling and Interlocking
(d) Material Handling

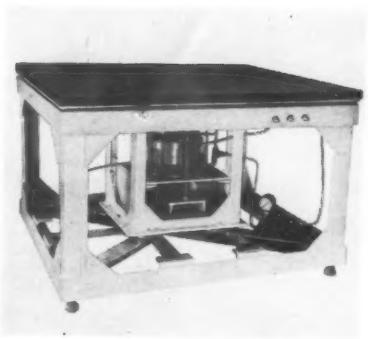


Figure 1. Flexural platform scale.

Electrical and pneumatic load cells are used in most comprehensive automatic weight control systems chiefly because of their inherent design, flexibility and versatility.

Flexure Platform Scales

When a weigh hopper is used, load cell weighing applications normally involve a multiple cell or a flexure platform arrangement. In a multiple cell arrangement, the weigh hopper is supported on three or more load cells, the outputs of which are either added or averaged and fed to a common indicator so that the total weight supported is indicated. Flexure platform scales are supporting structures designed especially for load cell applications. Figure 1 is an illustration of such a scale. Because these scales incorporate flexures or spring links, friction is eliminated. This, coupled with the small vertical motion (0.005 inches to 0.008 inches) required for most load cells to cause a full range change, permits a very rigid final weighing installation. The elimination of friction and the advantage of small motion makes these units particularly adaptable to dusty, dirty or corrosive atmospheres which can cause a decrease in sensitivity in normal scales and a consequent increase in maintenance costs. Because of the accuracy usually required for most weighing applications, electronic servo indicators are normally employed when electrical load cells are used as the instrumental weight sensing medium. Precision, custom calibrated pressure indicators are available if pneumatic cells are used as the weight sensing medium. Control circuits may be either electrical or pneumatic or combinations of both. However, all electric circuits are usually employed when electrical load cells are used. When pneumatic load cells are used the usual practice is to perform the control functions pneumatically with the interlocking and remote functions being performed electrically.

Material handling devices, such as screw conveyors, rotary feeders,

Mr. J. C. Williams is connected with Weighing Components, Inc., Hatboro, Pa.

vibratory feeders, belt conveyors, and valves may be either electric or pneumatic. This choice depends upon the specific control circuit, operating conditions, and other considerations.

The interplay of electricity and pneumatics stems from the extreme versatility and ease of design possible by employing standard manufactured pneumatic and electrical components. These can be obtained having a high degree of accuracy. At present it is common practice to use pneumatic pressure as the motivating force for positioning units such as rheostat operators and valve operators because of economic considerations and their adaptability to the subtle throttling control possible when pneumatic controllers are used in the control circuit.

To illustrate how an automatic instrumental weighing system can be separated into the divisions previously mentioned: that is, Sensing Indicating, Controlling, and Material handling, consider the following design in the design of a multiple batch system. It is desired to automatically and in sequence weigh out from supply, and discharge to process three different ingredients in a wide range of proportions so that any desired formulation can be obtained. Further, the system is to be interlocked so that only one ingredient can possibly feed at any one time and so that the weigh hopper cannot be discharged while it is being filled and vice versa. Indicating and alarm lights are to be provided to inform the operator at all times of every phase of the system's operation. Also, provision is to be made to take the system out of the automatic sequence so that the operator can, if he so desires, operate all of the filling, dumping, and weighing equipment manually. Of course, a single batch system is a special and much simpler case than the design described.

Load Sensing

Discussing the sensing phase of the system first, a pneumatic flexure platform scale, if used as the load sensing medium, provides a frictionless, rigid weighing structure which is easily installed. It is

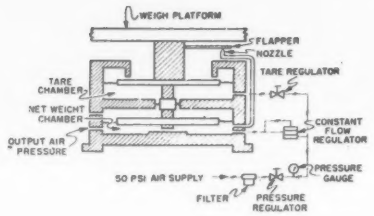


Figure 2. Schematic cross-section of load cell.

only necessary to secure a weigh hopper or tank to the platform of the scale. If desired, a mixer could be mounted on the scale proper. This scale is capable of supporting large tare weights with no decrease in sensitivity. Its calibration is also unaffected by vibrations and shock loading and it is extremely rugged. The pneumatic load cell is a force balance unit having a nozzle (air bleed port) and flapper. (See Figure 2 for a schematic cross-section of such a load cell). When a load is applied, the flapper closes the air bleed nozzle. A constant supply of air is applied to the nozzle via the net weight chamber; hence, pressure is built up in the net weight chamber until that pressure multiplied by the effective net weight chamber area equals the load applied and causes the flapper to open the nozzle just sufficiently to bleed off as much air as is supplied. Consequently, a condition of force equilibrium is established for each and every load that may be applied. There exists, for any given load cell, only one pressure which corresponds to any given applied net load. Electric flexure platform scales, that is, an electrical load cell in a flexure platform scale or a multiple electrical load cell arrangement could also be used as the load sensing unit. For the sake of brevity, they will not be considered here.

Indicating and Controlling Phases

To provide Indication—the second phase of a weighing system—for the pneumatic flexure platform scale, it is only necessary to measure the output pressure of the load cell. This may be accomplished by using a pressure gauge whose calibration is in pounds weight. An electronic servo indicator would probably be used if an electrical rather than pneumatic load cell was chosen for the load sensing medium in the design of this system.

The third and last phase to be discussed is Controlling and Interlocking. For the design under discussion, pneumatic switch devices with electrical pushbutton and relay interlocking will be employed because of the adaptability of these devices to simplified system designing. An all-pneumatic circuit could be used but is a little more complicated and involved. However, it can be justified if explosion-proofing is necessary. The same electrical circuit, which will be explained, could be used with an electrical load cell sensing medium by simply using different switches. A schematic pneumatic diagram together with one possible physical arrangement of the scale, hopper, and feeding units is shown in Figure 3. The auxiliary control equipment, which falls into the Control and Interlocking division is normally housed in a control panel or cubicle. Figure 3, will show that four, five or any additional number of ingredients can be accommodated by adding to the system more of the same kind of components in the same manner. Naturally, many modifications could be made by changing the penumatic and electrical circuits slightly. Figure 4 illustrates the control panel for a similar system used for automatically batching two ingredients. This system is a less complex one because the ingredients set weight indicators and checking circuit is not required.

Operating Sequence

A typical control panel layout for this system is shown in Figure 5, with its components listed in Table 1. To start the system, the operator turns the power switch (Item 21) to the "On" position. The fact that power has been applied to the panel is indicated by the power-on light (Item 30). The manual-automatic selector switch (Item 22) is placed in the "auto" position. The automatic control light (Item 32) is energized indicating the system will perform on automatic control. The operator next adjusts the Ingredient A set weight regulator (Item 9) until the pointer of the ingredient A set weight indicator (Item 6) points

to the weight of ingredient A desired for the particular formulation being set. Next, the weight of ingredient B is set by adjusting the ingredient B set weight regulator (Item 10) until the ingredient B set weight indicator (Item 7) reads the weight of ingredient B desired. Ingredient C is similarly set using the ingredient C set weight regulator (Item 11) and ingredient C set weight indicator (Item 8). The ingredient set weight indicators show at all times the weights of each ingredient as set by the operator for the particular formulation presently being compounded. The settings can be changed at any time during the operation without disrupting the sequence of the system. It should also be noted that the tare setting can be readjusted at any time without the necessity of resetting the set weight regulators (Items 9, 10, 11) since the tare regulator (Item 2) and set weight regulators are in separate pneumatic circuits. The net weight indicator (Item 5) shows the net weight in the weight tank or hopper at all times and gives the operator a further visual check of the operation and performance of the system. All these adjustments can actually be made in less time than it takes to read this description. Depressing the start button (Item 25) starts the automatic weighing in operation. This pushbutton, through appropriate circuitry, starts the feeder for ingredient A (Item 39), be it a screw conveyor, vibrating feeder, rotary feeder, valve, etc., so long as the feeding can be initiated and stopped by an electrical contact. At the same time, the feeding ingredient A light (Item 33) is energized informing the operator of the present stage of the feeding sequence. As the net weight approaches the weight of ingredient A previously set, the ingredient A dribble pressure switch (Item 13) causes the feed rate to be decreased by using two speed motors on screw, belt, and rotary feeders; by causing a valve to assume a partially closed position or by causing an additional resistance to be put across the driving coil of a vibratory feeder. When the set weight for ingredient A is reached the ingredient A shutoff

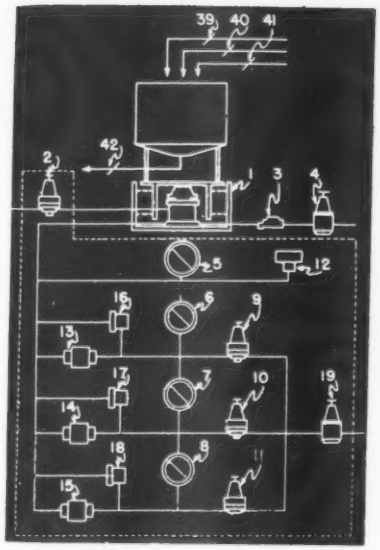


Figure 3. Possible physical arrangements of scale, hopper, and feeding units.

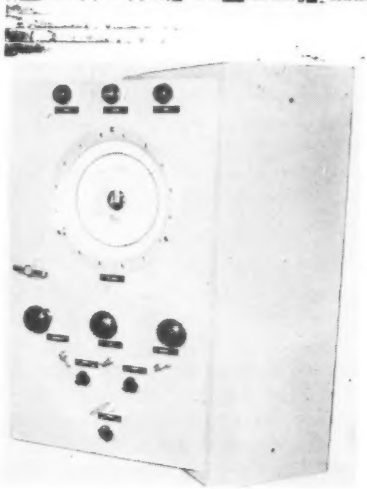


Figure 4. Control panel for automatically batching two ingredients.

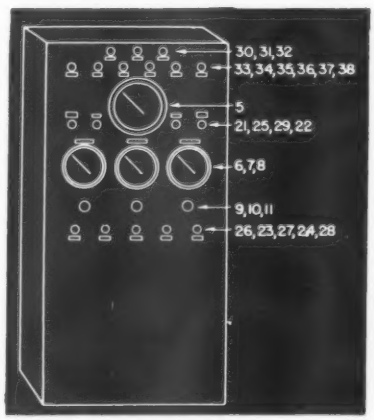


Figure 5. Control panel layout of the automatic batching system.

pressure switch (Item 16) causes the feeder for ingredient A (Item 39) to stop, the feeder for ingredient B (Item 40) to start, the feeding ingredient A light (Item 33) to be de-energized and the feeding ingredient B light (Item 34) to be lit. The same dribble and shut-off operation occurs when the ingredient B dribble and shutoff pressure switches (Items 14 and 17) slow the feed rate and then stop the ingredient B feeder (Item 40) and start the ingredient C feeder (Item 41). Simultaneously, the feeding ingredient B light (Item 34) is de-energized and the feeding ingredient C light (Item 35) is lit. The ingredient C feed is dribbled

ITEM	DESCRIPTION
1	Pneumatic Flexure Platform Scale
2	Tare Regulator
3	Constant Differential Pressure Regulator
4	Air Set
5	Net Weight Indicator
6	Ingredient A Set Weight Indicator
7	Ingredient B Set Weight Indicator
8	Ingredient C Set Weight Indicator
9	Ingredient A Set Weight Regulator
10	Ingredient B Set Weight Regulator
11	Ingredient C Set Weight Regulator
12	Zero Pressure Switch
13	Dribble Pressure Switch Ingredient A
14	Dribble Pressure Switch Ingredient B
15	Dribble Pressure Switch Ingredient C
16	Shutoff Pressure Switch Ingredient A
17	Shutoff Pressure Switch Ingredient B
18	Shutoff Pressure Switch Ingredient C
19	Air Set
20	Pneumatic Block for External Piping
21	Power Switch
22	Manual-Automatic Selector Switch
23	Ingredient Weight A Check Switch
24	Ingredient Weight B Check Switch
25	Start Button
26	Manual Button to Feed Ingredient A
27	Manual Button to Feed Ingredient B
28	Manual Button to Feed Ingredient C
29	Dump Button
30	Power On Light
31	On Manual Control Light
32	On Automatic Control Light
33	Feeding Ingredient A Light
34	Feeding Ingredient B Light
35	Feeding Ingredient C Light
36	Weighing Complete Light
37	Dumping Light
38	Batch Complete (Ready for Start) Light
39	Fill Valve or Feeder Ingredient A
40	Fill Valve or Feeder Ingredient B
41	Fill Valve or Feeder Ingredient C
42	Dump Valve or Feeder

Table I. Component list of items shown in Figures 3 and 5.

and shutoff at the appropriate preset weights through ingredient C dribble and shutoff pressure switches (Items 15 and 18). At this time, feeding ingredient C light (Item 35) is de-energized while the weighing complete light (Item 36) is lit. At this point, the system sequence is arrested until the dump pushbutton is depressed. If a timing sequence of batching is desired or if an electrical contact from some other part of the process

is available each and every time an additional batch is required, the dump bushbutton could be eliminated.

Depressing the dump pushbutton (Item 29) causes the weigh hopper discharge feeder (Item 41) to start, and the weighing complete light (Item 36) is de-energized while the dumping light (Item 37) is lit. It should be noted that the system is so interlocked that accidentally depressing the dump push-button previous to the time when this weighing complete light is lit will not start the discharge feeder and will not disrupt the sequence. Further, the system is so interlocked that only one feeder can possibly be energized at one time. The zero pressure switch (Item 12) provides one additional interlock which requires that the entire batch weighed out in the weigh hopper be discharged before the operator can initiate a subsequent weighing. When all the material is discharged, the dumping light (Item 37) is de-energized and the batch complete, "ready-for-start" light (Item 38) is lit informing the operator that he may now initiate another automatic cycle.

Remote Operation

To operate on the manual remote control cycle, the manual-automatic selector switch (Item 22) is placed in the "manual" position at which time the on manual control light (Item 31) is lit and the on automatic control light (Item 32) is de-energized. The system can be switched to manual operation at any time, even during the automatic weighing cycle. When on manual control, pushbuttons for manual feed of ingredient A, manual feed of ingredient B, manual feed of ingredient C, and dump button (Items 26, 27, 28 and 29) control the operation. Depressing these pushbuttons causes the appropriate feeders to be energized while releasing these pushbuttons de-energizes the feeders. The net weight indicator (Item 5) shows during all this time the net weight of material in the hopper. It can be used by the operator to inform him when he should depress and release the appropriate pushbuttons.

One additional feature incorporated in the system is the ingredient A and ingredient B weight check switches (Items 23 and 24) which allow the operator to arrest the automatic sequence before ingredient B starts to feed and/or before ingredient C starts to feed, by turning the switches to the check position. Returning these switches to their normal position restarts the system into its automatic operation at the point it was stopped. The checking switches for arresting the automatic sequence will allow an operator to stop the system without taking it off automatic control if for some reason it is necessary to lengthen the time period of batching. It is also useful in comparing the set weights as indicated on the ingredient set weight indicators with the actual controlled shutoff of material as indicated on the net weight indicator. This comparison can be used for purposes of adjusting the anticipatory action of the shutoff pressure switches for more accurate control. Anticipatory action may be required due to material suspended in the air after a feeder is stopped.

The system described was designed using a pneumatic load sensing unit, pneumatic indication, and electrical control and interlocking. A system could also be designed to perform the same given automatic control function but utilizing an electrical load sensing unit, electrical indication, and electrical control and interlocking.

Versatility of System

Modifications to the above design can be made. For example, a system designed using electrical load sensing, electrical indicating, and electrical control and interlocking had incorporated in its design several checking circuits. The system in addition to performing the control function as described previously also provided an automatic tare check circuit. This circuit prevented the system from starting up if the weigh hopper was not properly tared before each batch weighing. In addition, it had incorporated an automatic batch check weight circuit which prevented discharging a batch from the weigh hopper, if for some reason, the net weight of material in the weigh hopper at shutoff was not within the required tolerance.

One of the big advantages in addition to the versatility and flexibility of a system's functional performance is the fact that remote operation and adjustment is easily accomplished. Because of this advantage it is becoming increasingly more common in system design to provide for data reduction equipment. This automatically furnishes accounting information in the form of digital outputs an/or in the form of punched cards similar to those used in standard accounting machine work. Program control could be obtained by reversing this process and would entail using a group of punched cards, each containing a different formulation to be automatically controlled, which if used with the proper equipment would perform the automatic setting of system set points and adjustments. A fertile imagination might conjure up visions of a remote control room full of equipment where a formulation chart, which may take a form similar to an old player piano roll, is inserted in one end of the control equipment and, after due course of time, the total weight of each ingredient used, the total amount of each different product made, and other accounting information comes out the opposite end of the control equipment in digital or punch card form. All the while, those various products are packaged in predetermined amounts and are automatically and continuously conveyed to the shipping room. Maybe this is a visionary pipe dream. Yet, it is not beyond the realm of possibility to imagine an entire plant where the batching operations are all performed from a central remote control room. From information presented on this panel, an operator will know precisely the system status and he may make various adjustments to change from one formulation to another without leaving the control room. Central remote control rooms made possible through the use of instrumental weighing and control can be utilized for the weigh batching processes.

Present day emphasis on automation and the automatic factory seems certain to promote further development in this field.

PRODUCTION TIPS

——Shawningan's bulk handling of PVAc emulsion can mean savings in handling and storage

A NEW twist in the bulk handling of their polyvinyl acetate emulsions to paint manufacturers was demonstrated by Shawinigan Resins Corp. at the recent Pacific Coast Paint Materials and Equipment Show in Los Angeles, California.

According to A. W. Dunning, Shawinigan's director of marketing, this new method, involving the use of a Kaiser Nest-A-Bin adapted for liquid handling, is expected to provide their customers with the following advantages:

1. Reduce handling costs.
2. Save man-hours in emptying drums.
3. Reduce storage space.
4. Speed up blending operations.

The fluid Nest-A-Bin, manufactured of high strength corrosion resistant aluminum by Kaiser Nest-A-Bin Division, consists of two components; one upper and one lower body section which are joined at the center to form the assembled bin. When disassembled, the tapered body sections may be nested one within the other in the manner paper cups are nested, thus materially reducing space requirements for shipment or storage.

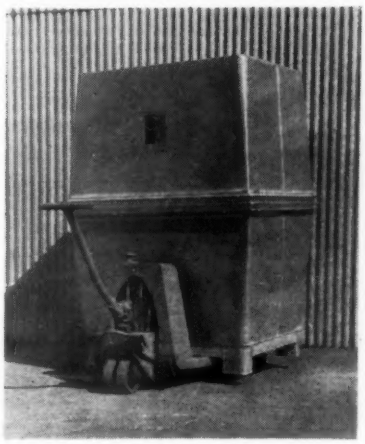
The bin, which may be placed adjacent to process equipment, is drained of emulsion through a hose connection at the bottom and easily filled from the top through a 3" diameter fitting.

Kaiser Nest-A-Bin holds 550 gallons, equal to the capacity of 10 drums.

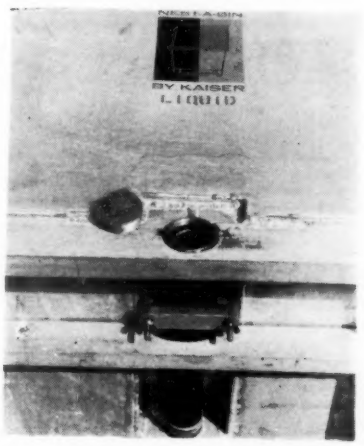
Each bin holds 550 gallons of emulsion equal to the capacity of 10 drums, capable of producing 1650 gallons of exterior paint or 2,200 gallons of interior paint. Total weight of a filled bin is over 2½ tons. In some instances, locating a bin of this capacity may pose some problems if proper material handling equipment is not available. However, handling by pallet or fork truck is permitted by the pallet type lower body section with 4" legs supplying adequate access space for equipment.

The customer can retain the bin for a maximum of two weeks after which period a rental penalty will be applied.

At the present time the use of the new container is experimental and is limited to the West Coast. "But," said Mr. Dunning, "we are highly optimistic about future expansion of the use of the container to other parts of the country."



The bin can be transported by a manually operated hydraulic lift truck.



Draining is accomplished by inserting brass valves into fitting at bottom of bin. Pinch cock shut off on neoprene hose is then opened for customer to meter off amount of emulsion needed.

Southern Production Club Breaks Record Attendance

Norman Kelley, on "The Role of the Technical Man in Purchasing."

AN ESTIMATED 520 people provided another record-breaking attendance for the 1956 meeting of the Southern Paint and Varnish Production Club held Feb. 29—Mar. 2 at the Atlanta Biltmore Hotel, Atlanta, Ga. The Exhibit Hall, which had to be used to gain entrance to the meeting room, was completely rented to forty exhibitors.

Parker W. Layman was elected president replacing Don D. Wyatt. Other new officers are: Ross S. McKenzie, president elect; John M. Rayfield, vice president; C. B. Thomas, secretary-treasurer. Members of the executive committee are: Clyde Schlesinger, R.B. McGoogan, Jr., A. W. Lynch, E. J. Davis, W. S. Herner, G. E. Arhart. Council representative: John J. Hughes, Jr., and alternate council representative: William A. Smith.

Present activities and future plans for building technical manpower for industry was discussed by Dr. Henry F. Payne of the University of Florida, and General Joseph F. Battley of the National Paint, Varnish & Lacquer Association. Production problems concerning equipment and how to get answers to specific questions on products and techniques were discussed in the "Modern Paint Making Machinery Panel" and in "General" Billy Hood's Open Forum. Normal Kelley, president of Southern Varnish Co., spoke on "The Role of the Technical Man in Purchasing."

Dr. Payne spoke on "Paint Technology and Research at the University of Florida." He said that the university now offers two undergraduate courses for students in their senior year, and one course for graduate students. The undergraduate courses consist of two hours of lecture and three hours of laboratory each week. The graduate course, "Special Topics in Organic Coatings," encompasses a series of specific subjects such as consistency in pigmented systems, corrosion resistant paints, fundamentals of film formation, etc.

Since General Battley could not attend the meeting, his comments were read by William E. Hood, Southern Zone vice president. General Battley again made the point that the paint industry is not keeping pace.

"The National Paint, Varnish and Lacquer Association," he said, "is doing something about the situation. I have appointed this year an entirely new Scientific Section Committee with

(*Turn to page 95*)

Members of the round table discussion on "Modern Paint Making Machinery." Seated (l to r), Sid Klein, Oliver F. Redd, Oakley H. Garlick, and L. S. Behrns. Standing (l to r), John J. Hughes, Jr., moderator, Charles R. Holman, W. S. Herner, and George E. Missbach.

Professor Henry F. Payne and his students in Organic Coating Technology at the University of Florida.

NEWS

Expect Large Gathering For Canadian Conference

Chemists and chemical engineers from all Canada have indicated that they intend to take part in the 39th Annual Conference and Exhibition of The Chemical Institute of Canada to be held in Montreal, May 28-30.

While discussing the value of this annual event, not only to technical men but to industries and Canada at large, T.H.C. Raikes, chairman of the Conference said that the growth of the Canadian chemical industry into a billion dollar a year business can be attributed in no small way to the exchange of information at these Annual Conferences. "So many new developments, methods, products, and machines appear each year, that few in the chemical field can keep abreast of everything, but a meeting such as this does provide an opportunity for all to obtain a quick review of general trends, as well as the latest information in their own specialties," he asserted.

The Conference and Exhibition will be held at the Sheraton-Mount Royal Hotel, with some lectures at McGill and the University of Montreal.

•

Witco Integrates Carbon Black Labs

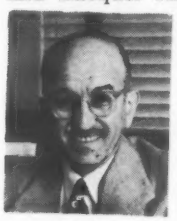
Witco Chemical Co. has reorganized its carbon black operations to put all laboratory facilities in one department, Max A. Minnig, president of Witco, has announced.

The new system establishes a direct line from the company's carbon black chemists to the customer.

John H. Gifford, who has been in charge of the new Witco rubber chemicals laboratory in Akron, is chief of the new department. He is responsible for all carbon black technical service, as well as for production control for Continental Carbon Co., a Witco associate. His new title is technical director, Carbon Black and Rubber Chemicals Division.

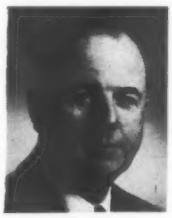
New York Club, Ass'n., Sponsor Joint Meeting

The New York Paint Varnish, and Lacquer Association and the New York Paint and Varnish Production Club sponsored a special joint afternoon and evening meeting April 5 at the Brass Rail Restaurant in New York City.



Ralph Lamenzo

The afternoon meeting was devoted to a panel discussion on "Paint Grinding Equipment," while the evening session featured a talk on the "Development of Ideas" by Raymond C. Groner of the Socony-Mobile Oil Co.



O. H. Garlick

H. E. Hillman

Elmer Peters

C. E. Kew

J. J. Taylor

Jack Zegelbone

Among the guests attending the evening meeting were the national officers of the Federation of Paint and Varnish Production Clubs, headed by President Clyde Smith.

Ralph Lamenzo, technical service manager, paint group, Sun Chemical Corp., moderated the panel discussion. Other members of the panel were:

Charles E. Kew, Kinetic Dispersion Corp., who discussed the operating principles, production rates, and overall efficiency of the Kady Mill; Elmer Peters, Kent Machine Works, who discussed the newer developments in roller mill technique, stressing the versatility and paste processing advantages of this workhorse of the paint industry; Oakley H. Garlick, Paul O. Abbe Co., who spoke on pebble and ball mill operation, emphasizing the quality and uniformity of product, low horsepower demand, and the low labor costs associated with this method of processing.

J. J. Taylor, consulting paint technologist of Los Angeles, presented a "Mathematical Approach Toward Pigment—Vehicle Ratios" based on the operation of Morehouse Mills and Cowles Dissolvers; Herbert E. Hillman, of the Eaglo Paint and Varnish Corp., and Jack Zegelbone, of A. C. Horn, Div., of the Sun Chemical Corp., represented production men in the discussion.

The problems faced by industry and their possible solution through applied creative imagination—the development of ideas—formed the subject matter presented at the evening session. The speaker, Raymond C. Groner, is a sales executive with Socony-Mobile Oil and a mechanical engineer with over 30 years of marketing experience.

Continental Can Buys Land

R. L. Perin, executive vice president of Continental Can Company's Metal Division, has announced that his company has made arrangements with the Southern Pacific Co. to acquire about 40 acres of industrial property in San Leandro, Cal., for future development. Construction of new facilities is expected to commence in 1957.

Synkoloid Enlarges Plant

Hunter Golladay, vice president and general manager of The Synkoloid Company of Texas has announced a major enlargement of the plant at Dallas.

Additional mixing and grinding units of the latest type will increase the plant's productive capacity by forty per cent. Completion is scheduled by the middle of this month.

Continental's Perma-Lining gives 100% coverage plus uniform film thickness

Continental's *Perma-LINED* steel containers give modern protection to hard-to-hold products

Now, the 100% protection of Continental's Perma-Lined steel containers is available for chemical, paint and petroleum products. Hot-sprayed within the formed container, and fast-baked, tough enamels cover every square-inch of inner surface. Even side- and bottom-seams, often a problem, get complete, uniform coverage.

Backed by our vast experience in tailor-made packaging, Continental Perma-Linings are available for almost every chemical, paint and petroleum product. In addition, our research department is fully prepared to develop new ones for your special use.

Why not put modern Perma-Lined steel containers to work for you? Just call your Continental representative.

TAILOR-MADE PACKAGE SERVICE

STEPPED-UP STORAGE TEST. Even after prolonged storage at 100°F., polyvinyl acetate glue fails to affect Perma-Linings. Never-ending research and testing by Continental scientists assures Perma-Lined steel containers of the highest quality.

CONTINENTAL CAN COMPANY

Eastern Division: 100 E. 42nd St., New York 17
Central Division: 135 So. La Salle St., Chicago 3
Pacific Division: Russ Building, San Francisco 4

NEWS

Imperial to Manufacture Line of Colors In Canada

Imperial Paper and Color Corp., Glens Falls, N.Y., has announced plans to manufacture a line of chemical pigment colors in Canada. A subsidiary Canadian corporation is being formed and a plant has been purchased in St. Johns, Que.

Many of the same basic pigments that Imperial Paper and Color Corporation is now making in its Glens Falls plant will be manufactured. The colors made in Glens Falls are currently sold in Canada through Imperial's subsidiary, Glens Falls Color Export Corp., a western hemisphere sales organization.

It is expected that ultimately the Canadian corporation will take over most of the sales now handled by the Glens Falls Color Export Corp. However, colors not made in Canada will still be available through the export subsidiary.

•

Rhodia, Inc. Moves Offices

Rhodia, Inc., manufacturer of aromatic chemicals, has moved to new and larger offices with improved facilities at 60 E. 56 St., New York 22, N. Y.

THE WINNER: Judges examine the entry that gained Philadelphia "The Ernest T. Trigg Grand National Award," highest honor in the 1955 National Cleanest Town Contest. Shown (from left to right), General Joseph F. Battley, president of the National Clean Up-Paint Up-Fix Up Bureau; and the judges, J. H. Carmichael, vice president of the U. S. Chamber of Commerce; Raymond Davis, special assistant to the Secretary of the Interior; William S. Kilborne, special assistant to the Secretary of Commerce. In the foreground are the two trophies won by Philadelphia: The Trigg award (left) and the trophy for highest honors in a population category of over a million residents.

Atlas Powder Scholarships

Atlas Powder Co., manufacturer of explosives, chemicals, and activated carbons, will award eight $1,000 college scholarships again this year, Ralph K. Gottshall, president, has announced.

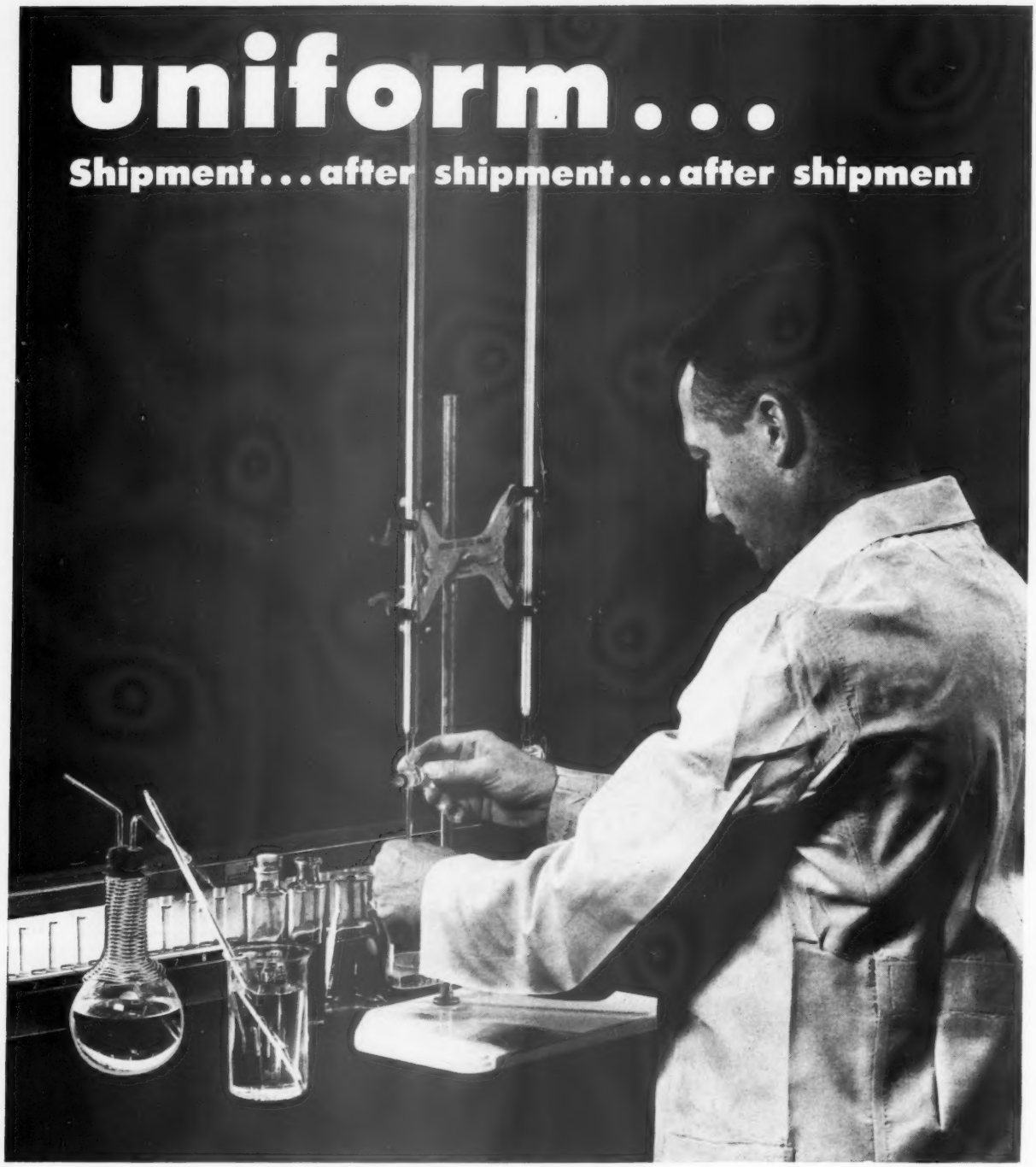
The grants will go to students who will be seniors during the 1956-57 college year, majoring in chemistry or any branch of engineering.

Resin Development Unit

Shell Chemical Corporation's new resin unit at its Houston plant will begin manufacturing market development quantities of new epoxy resins early this month.

C.W. Humphreys, the company's manufacturing vice president, said the unit will produce new developmental resins and curing agents for customers' experimental use and small commercial production.

LAB INSTRUCTION: William Lawrence and his Rutgers University Paint Technology class were guests recently of Sidney B. Levinson and three of his associates at the D. H. Litter Laboratories in New York City. The group was given a practical demonstration of the formulation, preparation and evaluation of a typical enamel and floor varnish. Photo at left shows (l to r), William Lawrence, Flood & Conklin Mfg. Co.; Jerome L. Frankel, Advance Solvents & Chemical Co.; Morton Meltzer, D. H. Litter Co., Inc.; Nathan Kavett, Chemlite Paint & Varnish; Michael D. Boruch, Witco Chemical Co.; David Rosse, Atlas Coatings Co.; John O. Harrower, National Lead Co.; Leonard Freund, Farnow, Inc. Photo at right shows (l to r), Julius Rothstein, D. H. Litter Co., Inc.; David M. Bentley, William S. Ladd, Jr., and Kenneth Russell, Nuodex International, Inc.; Herbert Millwater, Timeproof Paint Products Co.; William Springmeyer, Nuodex International, Inc., and William Lawrence.



Cargill Incorporated

PRODUCT OF Cargill CREATIVE PROCESSING

Suppliers to the Paint and Varnish Industry

Linseed Oil • Soybean Oil • Fish Oil • Alkyd Resins • Specialty Products

CELANESE* VINYL PROPIONATE MONOMER

goes "tankcar!"

Full scale production of new monomer provides new source for homopolymers and copolymers with distinctive product-improving properties

Celanese Vinyl Propionate Monomer in volume clears the way for the commercial development of new emulsion paints, adhesives, laminates, plastics, synthetic rubbers, protective coatings and finishes.

Like Vinyl Acetate—first of the Celanese Vinyl Monomers—Vinyl Propionate copolymerizes with acrylics, maleics, styrene, butadiene, and most other vinyl monomers. It promises new product values for many fields.

You can get prompt delivery of Celanese Vinyl Propionate in drum lots to tankcar quantities. For samples and technical bulletin, write:

Celanese Corporation of America, Chemical Division, Dept. 558-D 180 Madison Avenue, New York 16.

DESCRIPTIVE DATA

Distillation Range @ 760 mm, °C	Within 6° spread Including 94.9
Color APHA, max.	30
Aldehydes as acetaldehyde, % wt., max.	0.05
Water, % wt., max.	0.25
Specific Gravity @ 20°/20°C	0.9160-0.9185

CHEMICAL PROGRESS WEEK-APRIL 23-28

Celanese* CHEMICALS

*Reg. U. S. Pat. Off.

HIGH CONCENTRATION

...what it means to you in better formulating with

ACCOSPERSE*

PIGMENT DISPERSIONS

- strong deep tones in latex paints – with a minimum of dilution effect
- good pastel tints with about half the water normally required
- higher consistency and more even flow

plus these important "extras"

- stability even at abnormal temperatures
- less storage space required for volume users
- easier handling and pouring

Accosperse Pigment Dispersions are homogenized, uniform, colloid-stabilized.

SAMPLES? Yes!
Also Technical Bulletin 2-5-4.
Send for them!

COLOR ***is the difference***

CYANAMID

AMERICAN CYANAMID COMPANY
PIGMENTS DIVISION
30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y.

Branch Offices and Warehouses in Principal Cities

*Trademark

CHEMICAL PROGRESS WEEK-APRIL 23-28

Toning

makes 5 units of

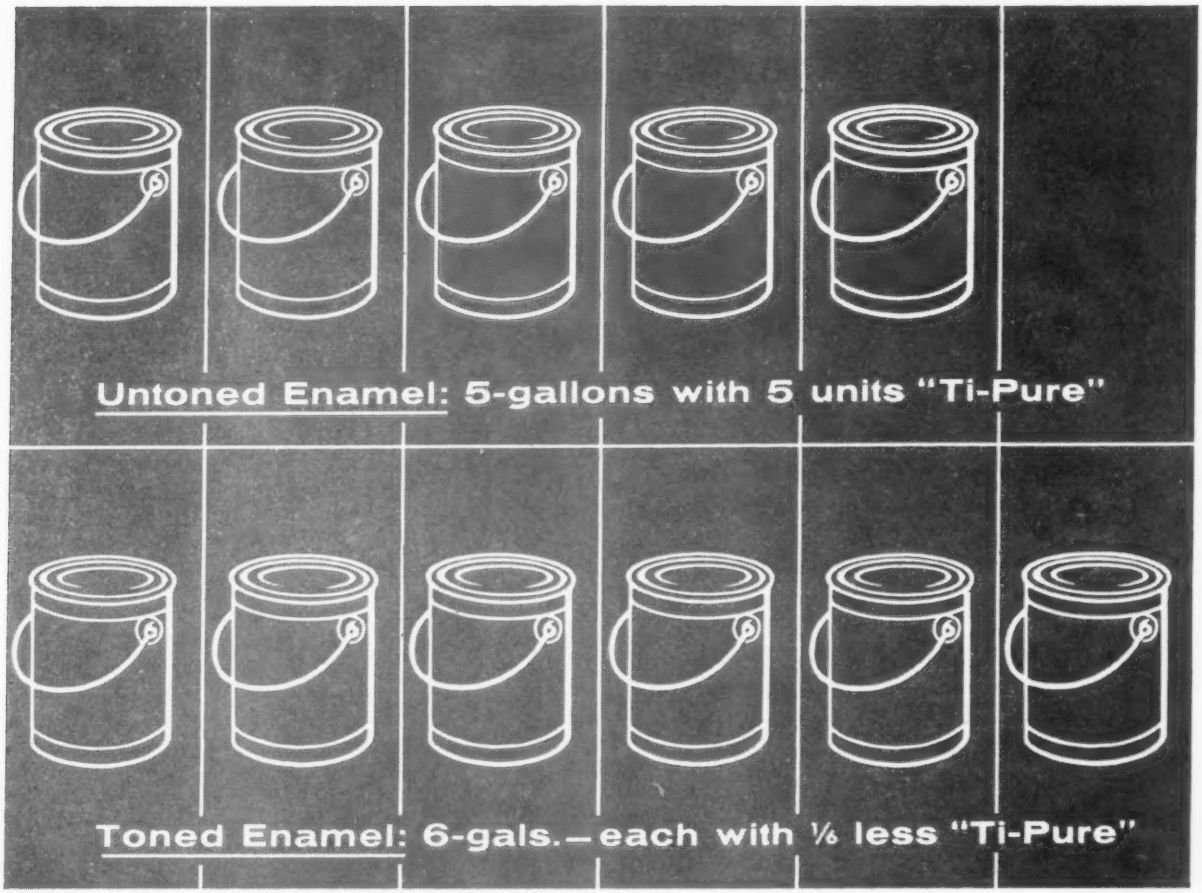
Ti-Pure®

TITANIUM DIOXIDE PIGMENTS

do the work of 6

Toning lets you stretch your supply of Du Pont "Ti-Pure." Yet tests show toned enamels have equal or greater opacity—have only slightly diminished brightness.

"Ti-Pure" gives your architectural and industrial enamels the full range of properties needed for lasting whiteness and excellent overall performance.



YOUR DU PONT REPRESENTATIVE will gladly show you how to stretch your supply of "Ti-Pure." Call or write: E. I. du Pont de Nemours & Co. (Inc.), Pigments Department, Wilmington 98, Delaware.

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

NEWS

ASTM Committee D-1 Makes Recommendations

A number of new methods, specifications and revisions of standards were presented at the meeting of Committee D-1 on Paint, Varnish, Lacquer, and Related Products held in Buffalo Feb. 29—Mar. 2 during ASTM Committee Week.

One highlight was a technical paper dealing with the Preparation of Magnesium for Painting, presented by Dr. J. A. Stevens, Dow Chemical Co.

A revision of the Tentative Method of Test for Flash Point of Volatile Flammable Materials by Tag Open-Cup Apparatus (D 1310-55 T) was submitted to include an improved calibration procedure and a few other minor changes. Method D 1310 applies only to determining the flash point of non-viscous materials.

Recommended for adoption as standard were tentative methods of test for No-Dirt-Retention Time of Traffic Paint (D 1297), Settling Properties of Traffic Paints During Storage (D 1309), Phthalic Anhydride Content of Alkyd Resins and Esters Containing Other Dibasic Acids (Gravimetric) (D 1306), Phthalic Anhydride Content of Alkyd Resins and Esters Containing Other Dibasic Acids (Spectrophotometric) (D 1307), and Apparent Free Phenols in Synthetic Phenolic Resins or Solutions Used for Coating Purposes (D 1312).

A new method has been developed for determining non-volatile content of heat-unstable resin solutions. This will be incorporated in Tentative Methods of Test for Non-volatile Content of Resin Solutions (D 1259), which now cover solutions for heatstable resins. Two Recommended Practices for Preparation of Aluminum Alloys for Painting and for Preparation of Magnesium Alloy Surfaces for Painting were submitted for publication this year.

New Tentative Methods for Analysis of Fatty Acids, which cover procedures for acid value, saponification value, unsaponifiable matter, teter value, iodine value and color were submitted along with the new Tentative Methods for Sampling Drying Oils.

The Subcommittee on Varnish submitted a new Proposed Method for Rosin Acid Content of Varnishes. Consideration is being given to draft in an ASTM from the Federal Test Methods for gas checking, draft test, qualitative test for rosin and ash of clear materials.

The Subcommittee on Physical Properties submitted a new Tentative Method for Measurement of Dry Film Thickness of Non-Metallic Coatings Applied on Non-Magnetic Bases.

The Tentative Method of Test for Nonvolatile Matter in Lacquer Solvents and Diluents (D 1353-54 T) was recommended for adoption as standard. Test panels and synthetic perspiration test solutions have been prepared and sent to subcommittee members for study.

The next meeting of the committee will be held at the Society's Annual Meeting June 17-22.

•

To Build Methanol Plant

Plans for construction of a new plant to produce 7,000,000 gallons of methanol a year were announced by Hercules Powder Co.

The plant, to cost in excess of $2,000,000 will be built at Louisiana, Missouri.

SYLOID® 162

Davison's NEW Alkyd-Urea Flatting Agent, for Synthetic Finishes, gives you

MORE FLATTING POWER AT LOWER COST

Laboratory tests and actual use tests have proven that **SYLOID 162:**

- **can be ground in one-quarter the time required by other varnish flatting agents.**
- **the flatting power is two to three times greater than existing materials.**
- **twice as much can be ground in a single mill charge.**
- **the high and low tones are not destroyed as with present varnish flatting agents.**
- **films are tough, durable and mar resistant.**
- **has an exceptionally high chemical purity.**
- **chemical properties are controlled to insure uniform performance.**
- **there is no "seeding".**

For further information on SYLOID 162—the alkyd-urea varnish flatting agent that gives you better performance at lower cost—write

Progress Through Chemistry

DAVISON CHEMICAL COMPANY

Division of W. R. Grace & Co.

BALTIMORE 3, MARYLAND

Producers of Catalysts, Inorganic Acids, Superphosphates, Triple Superphosphates, Phosphate Rock, Silica Gels and Silicofluorides. Sole Producers of DAVCO® Granulated Fertilizers.

NO STREAKS, NO SAG

in paints made with

Dutch Boy BENTONE® 34

Improves both color uniformity and brushing in flats, semi-gloss and gloss enamels

DUTCH BOY BENTONE **34** makes pigments behave, controls flow properties.

❶ When pigments behave, you get color uniformity

BENTONE **34** keeps colors well-dispersed. Insures full color development. Helps maintain color and gloss uniformity by keeping penetration constant. Prevents color loss by pigment agglomeration.

Pigments behave because BENTONE gel structure keeps them in their place.

Excellent finish uniformity is obtained by maintaining full color value in single pigment paints. In multiple pigment paints, the BENTONE gel retards flooding and floating. These benefits without affecting solvent release.

❷ With better flow control, you get better brushability

Take a paint that "pulls" under the brush. You can eliminate this problem with DUTCH BOY BENTONE **34**. Very desirable brushing properties can be imparted while sag resistance is kept high.

Take a "soupy" paint. BENTONE **34** stops the sag. Keeps brushability high.

What it provides is thixotropic viscosity . . . ready flow when paint is worked . . . resistance to flow when undisturbed.

BENTONE **34** preserves these advantages because it insures excellent package stability. Prevents hard settling. Assures stable, uniform viscosity. Not affected by temperature changes.

DUTCH BOY BENTONE 34 Handbook suggests formulations . . . shows how you can improve color uniformity, brushability and other properties of interior paints. Many other paints, too. Write for a copy.

Dutch Boy® CHEMICALS

NATIONAL LEAD COMPANY
111 Broadway, New York 6, N. Y.
In Canada: CANADIAN TITANIUM PIGMENTS LIMITED
630 Dorchester Street, West • Montreal

Laboratory technicians of Rohm & Haas Company are shown sampling a three-year-old batch of Rhoplex AC-33 *acrylic* emulsion. After three years' outdoor storage and much freight handling, this emulsion showed no significant deterioration.

3 years of outdoor storage and RHOPLEX AC-33 acrylic emulsion is still stable

In three years of continuous outdoor storage, summer heat and winter cold have had little effect upon the stability of this commercial batch of RHOPLEX® AC-33 *acrylic* emulsion. No measurable coagulation has occurred, and the pH of the emulsion has dropped from 9.3 to only 8.9.

Further tests also showed that paints based on this emulsion have properties equivalent to those of paints based on freshly-prepared emulsion — properties which include scrub resistance, good adhesion, color retention, and fast drying.

You get these properties—and stability—when you base your paints on RHOPLEX AC-33 *acrylic* emulsion. Write for a sample and detailed information.

Chemicals for Industry

ROHM & HAAS COMPANY

THE RESINOUS PRODUCTS DIVISION

Washington Square, Philadelphia 5, Pa.

Representatives in principal foreign countries

It's Performance That Counts!

You can rely on the performance of

ODORLESS PHILLIPS 66 SOLTROL®

Count on Phillips, too, for dependable supply and fast deliveries in 4,000 or 8,000 gallon tank cars, or in 6,000 gallon compartment cars containing both Soltrols. Order Soltrol 130 for conventional drying characteristics, Soltrol 170 for longer wet edge. Write for FREE samples of these high quality, *odorless* thinners.

ODORLESS MINERAL SPIRITS

SOLTROL

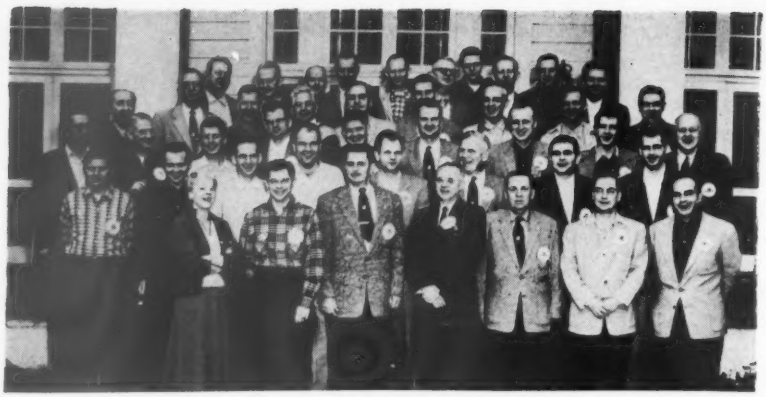
PHILLIPS PETROLEUM COMPANY
SPECIAL PRODUCTS DIVISION
BARTLESVILLE, OKLAHOMA

NEWS

CSC Methanol Expansion

Commercial Solvents Corp. will spend $10,000,000 to expand its methanol and petrochemical derivatives facilities, it was announced by J. Albert Woods, president.

The new construction will be an addition to CSC's Sterlington, Louisiana plant. A portion of the appropriated funds will be spent at the Terre Haute, Indiana plant for the expansion of facilities to process the company's basic products into upgraded chemical derivatives.



SALES CONFERENCE: The pigments division of Metals Disintegrating Co. recently held its annual sales conference at Myrtle Beach, S.C. Attended by over fifty persons, the meeting was in charge of Harold E. Collins, vice president in charge of sales. A feature of the conference was several sessions devoted to distributor operations. Other sessions were given over to various sales and technical aspects of company's aluminum pastes, powders, gold bronze and powders.

Boy, did the boss give me an earful about making sure to get FEIN'S PAILS and CANS!

Fein's containers give you *exactly* what you need . . . and you get them exactly when and where you need them. Fein's complete line includes: Steel Pails, Thinner, Varnish and Shellac Cans; 1 Gallon and 1 Quart Triple-Tite Paint Cans.

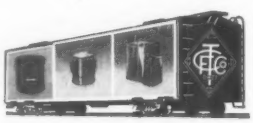
Inquire today about our unique Mixed Carload Shipment Plan.

FACTORIES AND SALES OFFICES:

FEIN'S TIN CAN CO., INC. . . . . Brooklyn, N. Y.
ATLAS CAN CORP. . . . . Brooklyn, N. Y.
PEERLESS CAN CORP. . . . . Brooklyn, N. Y.
COMMERCIAL CAN CORP. . . . . Newark, N.J.
STANDARD CAN CORP. . . . . Pittsburgh, Pa.

SALES OFFICES: Philadelphia, Baltimore, Cleveland, Cincinnati, Boston
The Smith Can Co., Atlanta, Georgia;
Magic City Bottle & Supply, Miami, Fla.

PHOTO-CONSTANCE BANNISTER



M. S. Swanson, 64, Dies, Raffi and Swanson Treas.

Martin S. Swanson, 64, treasurer of Raffi & Swanson, Inc. died Mar. 3.

His company was founded as partnership with Charles L. Raffi in 1933, and its manufacture of industrial finishes was carried on in Chelsea for 30 years until operations were transferred to the new Wilmington, Mass. plant in 1954.

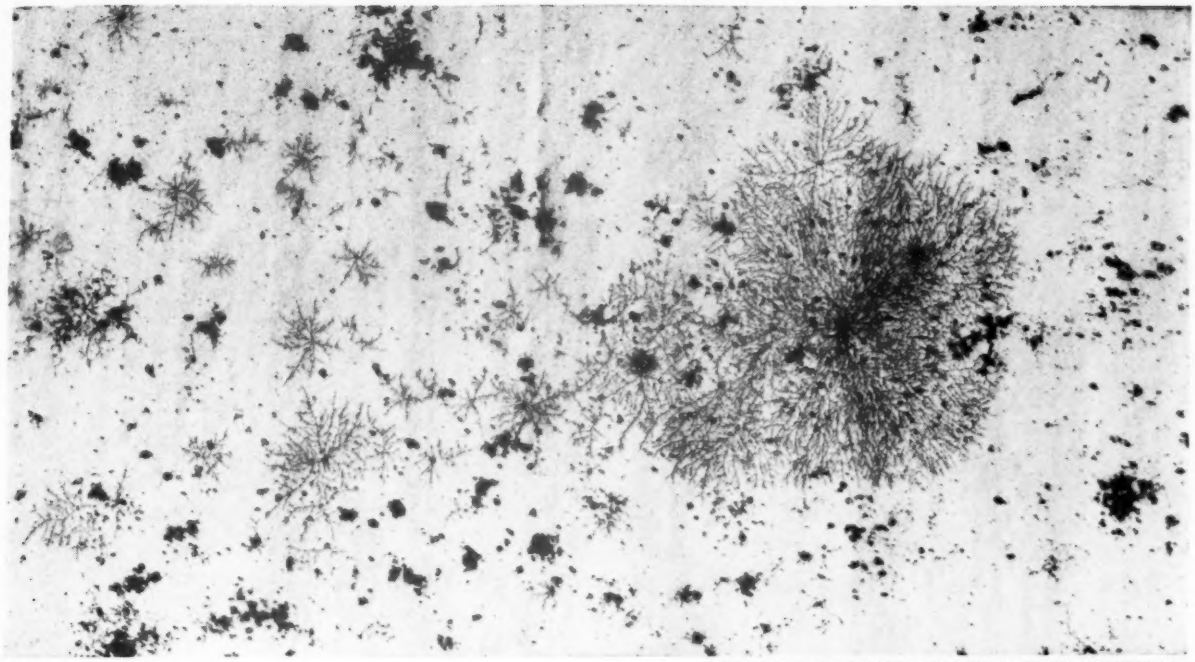
Mr. Swanson was born in Ralston, Pa. and was graduated from Harvard in 1918. He also pursued special studies at the Sorbonne in France. He was a member of the American Chemical Society, served as treasurer of the N. E. Paint Production Club and member of the Technical Committee of the U. S. Paint, Varnish and Lacquer Association.

Besides his widow Hazel, Mr. Swanson is survived by four sons, Richard, Ralph, Robert and Roger, all of Winchester, Mass.

Rowe Paint Changes Name

Rowe Products Inc. is the new name of Rowe Paint & Varnish Co., Inc., Niagara Falls, N. Y.

According to Ray T. Crowell, president, the change is one of name only—ownership, management, personnel, products and policies remain the same. It was made because "Paint & Varnish" were no longer descriptive of the company's expanded activities, he explained.



TEN DIAMETER PHOTOGRAPH OF MILDEW AT NEW ORLEANS TEST SITE

HAVING MILDEW PROBLEMS?

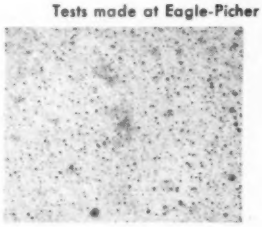
Then, formulate with

EAGLE-PICHER
Leaded Zinc Oxide

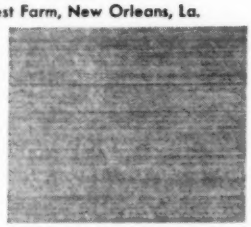
WITH EAGLE-PICHER LEADED ZINC OXIDE in your house paint formulation, you can provide improved resistance to mildew. Yes, scientific tests prove that house paints formulated with Eagle-Picher Leaded Zinc Oxide not only resist mildew discoloration but offer far superior decorative value and longer life at low cost.

HERE'S PROOF OF MILDEW RESISTANCE IN HOUSE PAINTS!

Tests made at Eagle-Picher Test Farm, New Orleans, La.



Mildew discoloration after 5 months vertical south exposure, without Eagle-Picher Leaded Zinc Oxide. (No fungicide used.)



No mildew after 5 months vertical south exposure, with paint* made from Eagle-Picher Leaded Zinc Oxide. (No fungicide used.)

***Formulation of Leaded Zinc Oxide Paint Used in Test**

Pigment—62.2%		Vehicle—37.8%	
E-P #356 Leaded ZnO	50.0%	Raw Linseed Oil	60.5%
TiO_2—Anatase	15.0	Z-3 Linseed Oil	19.5
Magnesium Silicate	35.0	Mineral Spirits	18.2
	100.0%	24% Pb	1.3
		6% Co	.5
			100.0%

PVC—32.0%

Since 1843

EAGLE EP PICHER

THE EAGLE-PICHER COMPANY

Largest Producer of Both Zinc and Lead Pigments

General Offices: Cincinnati 1, Ohio

Regional Sales Offices: Chicago, Cleveland, Dallas, New York, Philadelphia, Pittsburgh

Taken a good look at

at new, lower vinyl resin costs?

Now, you can have the superior performance, stronger sales story of Vinyl Resins at lowered cost.

Previous costs may have been too high for your formulations. Today, take a *new* look... a close look...and a *good* look for you. Because you'll be quite surprised when you recalculate to see how reasonably you can formulate and produce with BAKELITE Brand Vinyl Resins.

With BAKELITE Resins you get a broad line of resins for greater diversity...and some newcomers in resins and techniques that can give you a real opportunity for sales leadership.

Better write today for up-to-date information. Dept. OQ-153.

BAKELITE Vinyl, Polyethylene, Phenolic, and Epoxy Resins and Styrene and Vinyl Acetate Latexes for Coatings.

It ~~pays~~ saves to formulate with

BAKELITE
BRAND
RESINS for COATINGS

BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd St., New York 17, N. Y.
The term BAKELITE and the Trefoil Symbol are registered trade-marks of UCC

Have you checked on

African Wood Oil ?

LOW COST: priced substantially under Tung oil.

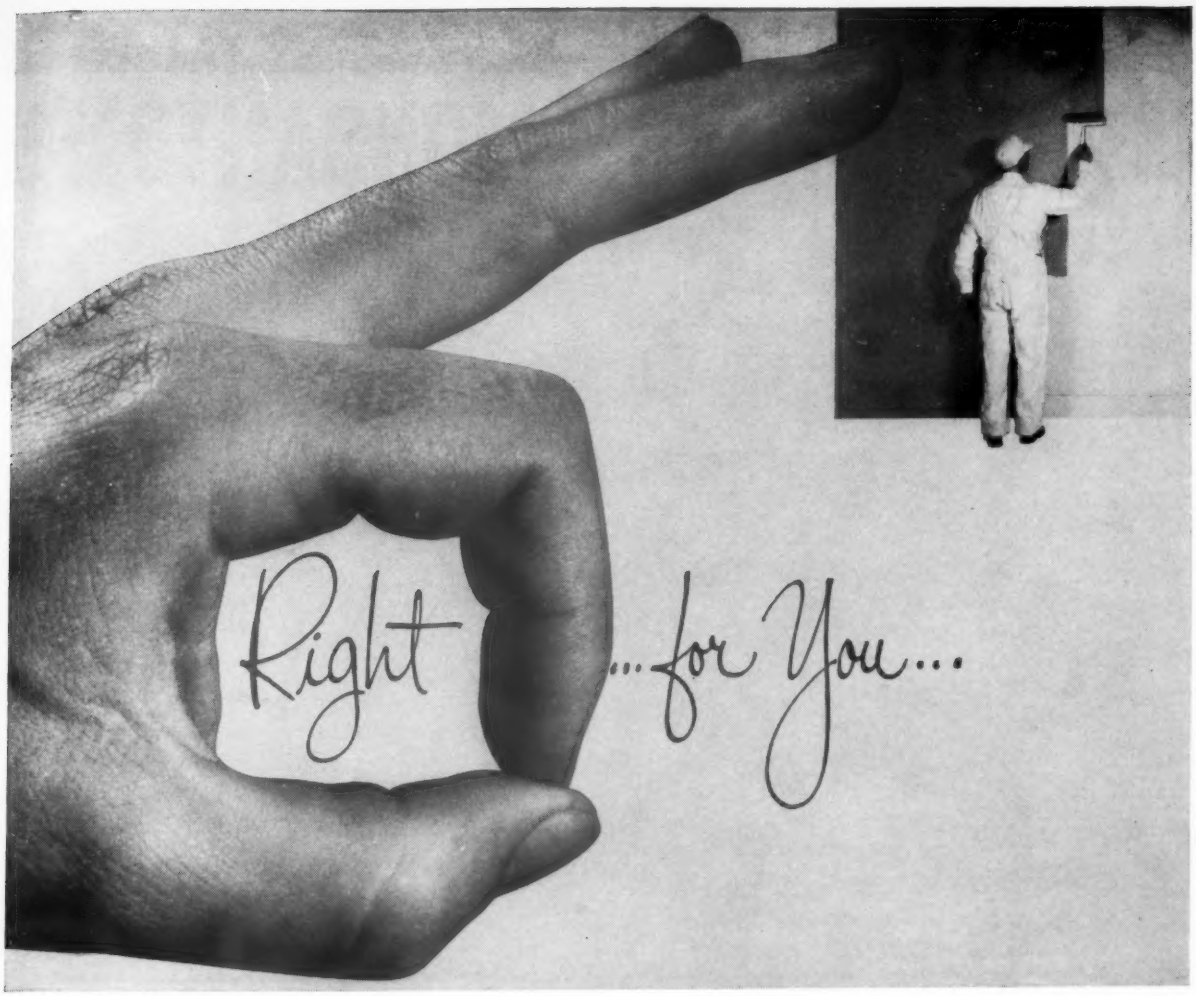
GOOD RESULTS: properties of varnishes and vehicles made from African Wood Oil compare quite closely with those made from ordinary Tung oil. Since polymerization or gelling time is longer (Browne test average 21) than regular Wood oil, straight phenol cooks can be made much more easily and with more uniform results — less chance of gelling.

AVAILABLE: Stocks on East and West Coasts are ready for immediate shipment.

Write for free booklet on African Wood Oil

PVO
OILS
VARNISH
PAINT &
PACIFIC VEGETABLE OIL CORP.

62 Townsend Street
San Francisco, Calif.



NIACET vinyl acetate monomer...

Brand

CARBIDE
AND CARBON
CHEMICALS

Carbide and Carbon Chemicals Company
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

High Quality backed by the experience of the pioneer and leader in the field.

Speedy Shipments in any quantity to meet your needs from plants located at Niagara Falls, New York, and Texas City, Texas, and from bulk storage at Newark, New Jersey.

Increased Production that keeps pace with your expanding requirements —new units at Texas City will be on stream in 1956, more than doubling this plant's capacity.

For additional information, on how NIACET vinyl acetate monomer can help you make money, call or write the Carbide and Carbon office nearest you. Offices located in 26 principal cities. In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Montreal and Toronto.

The term "Niacet" is a registered trade-mark of Union Carbide and Carbon Corporation.

STANDARDIZE ON MONSANTO FOR P

TRAFFIC PAINTS MADE WITH MONSANTO AROCLOR GIVE OUTSTANDING TOUGHNESS AND ADHESION

PHTHALATES • ADIPATES • PHOSPHATES • PHTHALYL GLYCOLATES • SULFONAMIDES • CHLORINATED POLYPHENYLS • SPECIALTIES

PLASTICIZERS FOR...

Nitrocellulose	**Cellulose acetate butyrate**
Polyvinyl acetate	**Shellac**
Styrene-butadiene	**Zein**
Epoxy	**Polystyrene latex**
Polyvinyl chloride	

You can control costs, save time, make your quality control easier—when you make Monsanto your prime supplier.

SEVEN basic plasticizer types from ONE supplier to simplify your purchasing. With Monsanto as your supplier you get:

(1) Reliable one-stop service, because Monsanto is America's most diversified producer of plasticizers for paints. (2) Delivery when you want it. (3) Mixed bulk shipments for economy.

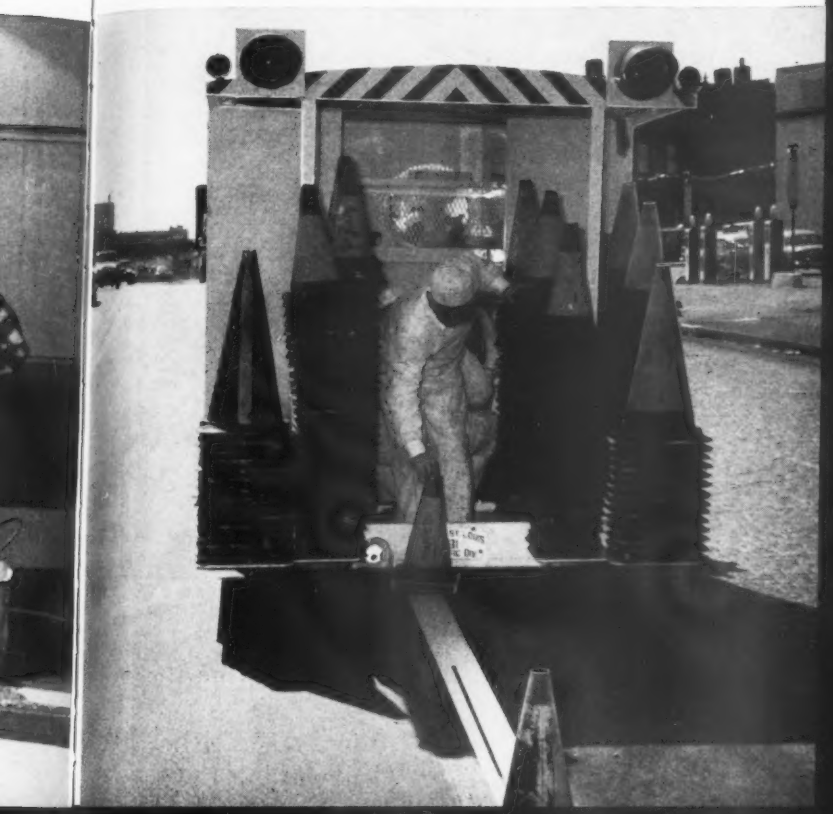
You'll find lots of advantages—working with the leader in paint-making materials. Monsanto's dibutyl phthalate is a dependable, low-cost flexibilizer for post-plasticized systems—and Monsanto is America's *only* supplier of a variety of chlorinated polyphenyls for styrene-butadiene systems. More important—you learn new tricks-of-the-trade in processing—as fast as Monsanto's research develops new fundamental knowledge for processing technology.

Monsanto AROCLOR products—chlorinated polyphenyls—are superior plasticizers for styrene butadiene systems. They are available as *inert, low-volatile* liquids and solids that increase paint flexibility, step up weather resistance and all-around durability. Specify liquid AROCLOR 1254 or solid AROCLOR 5460 for the best cost-performance combination.

AROCLOR: Reg. U. S. Pat. Off.

OR

PROFITS IN PAINT



Stucco paints "built" with Monsanto AROCLOR plasticizers seal well, resist moisture.

Monsanto AROCLOR plasticizers give traffic paints resistance to sunlight, abrasion, greases, and oils.

TRAFFIC PAINTS formulated with AROCLOR 1254 and AROCLOR 5460 excel in:

- resistance to sunlight and abrasion
- excellent wetting and penetration through dirt or foreign matter
- rapid drying
- long wear
- resistance to alkalinity of concrete

OTHER EXTERIOR FINISHES—for poured concrete, cinder blocks, cinder bricks, asbestos shingles, stucco, brick—made with AROCLOR plasticizers avoid such trouble as:

- penetration, blistering or leaking of paint film
- peeling due to inadequate toughness and adhesion of film
- weather damage from storms, heat or cold
- corrosion from acids, alkalis, motor oils, salt solutions

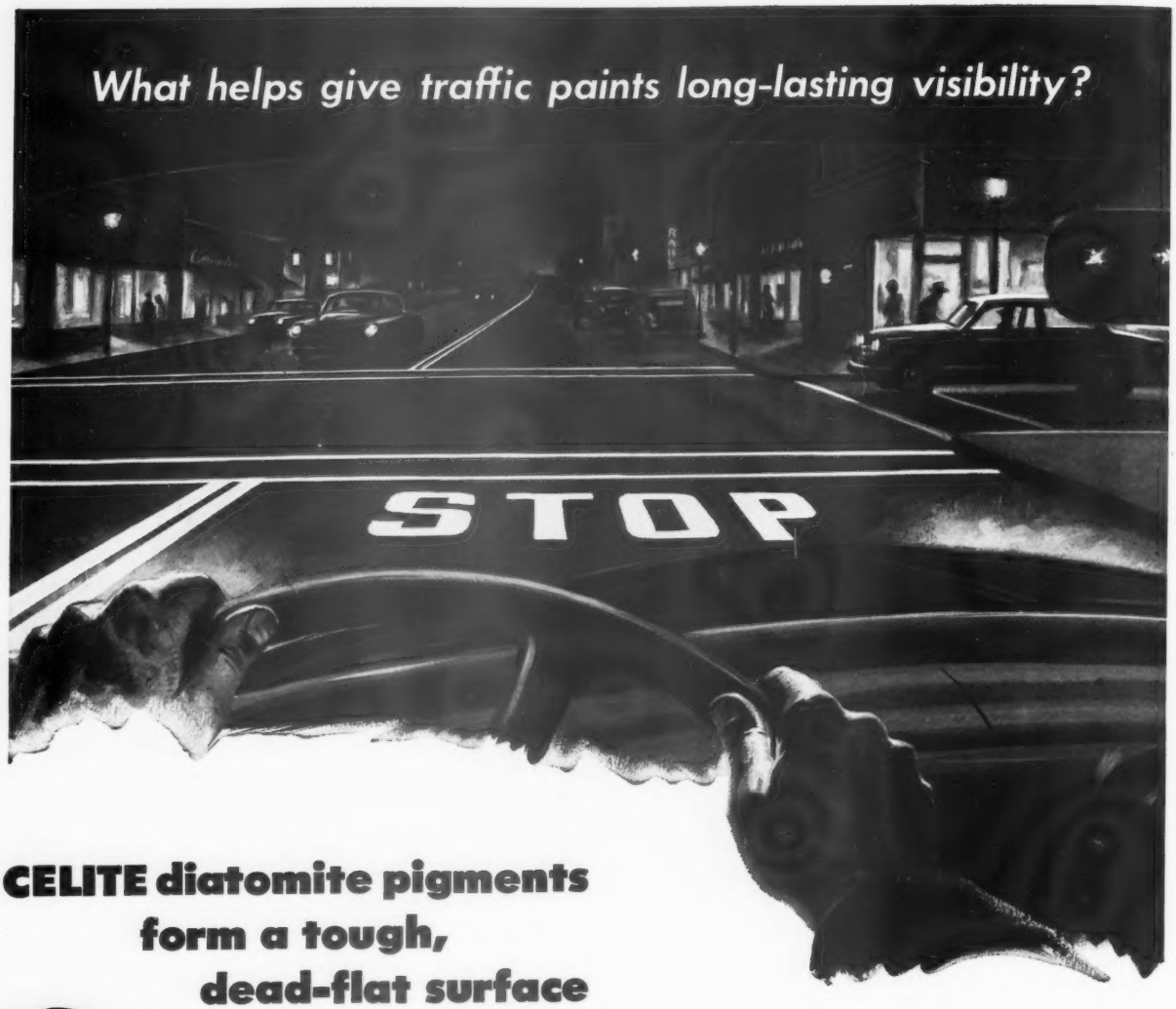
For technical details, contact your Monsanto salesman, or write Organic Chemicals Division, Monsanto Chemical Company, Department PT-2, 800 N. Twelfth Blvd., St. Louis 1, Missouri.

CHEMICAL PROGRESS WEEK—APRIL 23-28

A BETTER AMERICA THROUGH CHEMICAL PROGRESS

MONSANTO

Where Creative Chemistry Works Wonders For You



CELITE diatomite pigments form a tough, dead-flat surface

Intricately shaped Celite particles, shown in photomicrograph above, project through the film to produce a highly visible textured surface.

TRAFFIC LINES are only as good as their visibility. That's why many states specify Celite in their traffic paints. These microscopic particles roughen the texture of the paint film cutting gloss and creating a flat surface that is highly visible under all conditions both day and night.

What's more, being silica, they are strong and rigid, imparting abrasion and wear resistance. Celite speeds drying by permitting the paint film to breathe. This also counteracts the usual flaking and cracking action caused by the vapor pressure of moisture coming through the concrete.

Celite particles provide better adhesion to any road surface, increase body and give good workability. For further information write Johns-Manville, Box 60, New York 16, New York. In Canada, 565 Lakeshore Road East, Port Credit, Ontario.

JOHNS-MANVILLE JM PRODUCTS

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products

Johns-Manville CELITE THE EXTENDER PIGMENTS FOR ALL COATINGS

NEWS

Skin Diseases Costing Industry Needless Toll

Occupational skin diseases are costing American industry millions of dollars annually, and most of this loss is totally unnecessary, according to Dr. Louis Schwartz, retired medical director of the U. S. Public Health Service.

"A few simple preventive measures," he said, "could sharply reduce this annual toll in lost production."

Actual examinations made by Dr. Schwartz in various plants employing a total of about 117,000 workers revealed 1,400 cases of occupational skin disease. On the basis of this test it appears that more than one per cent of American industrial workers are affected with skin diseases of varying degrees of severity.

The highest incidence occurred in the manufacture of synthetic resins and chemicals and dyes. Exposure to petroleum products and greases, alkalis and cement, solvents, plants and woods, metals and metal plating, rubber and its compounds, and paints and enamels also produced a high rate of skin disease cases.

Protective clothing and protective ointments says Dr. Schwartz, afford the best shield against irritants. The clothing should be properly designed to be light and comfortable but of an impervious material. Gloves, aprons, boots and sleeves of natural rubber, synthetic rubber or certain plastics afford adequate protection in most cases. The use of ointments can be facilitated if packaged in collapsible metal tubes.

Dr. Schwartz emphasized that personal cleanliness on the job is the most important single measure in preventing occupational skin diseases. This calls for the location of washing facilities and showers near to work stations and ready access to laboratory-tested skin cleaners and protective ointments. Individual tubes of ointments for employee use in the plant offers added protection, he asserted.

Of course, the first line of defense against industrial skin diseases, Dr. Schwartz pointed out, should be the careful design and construction of new plants and factories. Proper ventilating systems will do much to keep chemical irritants from workers' skins, he explained.

•

Mantrose Adds Company

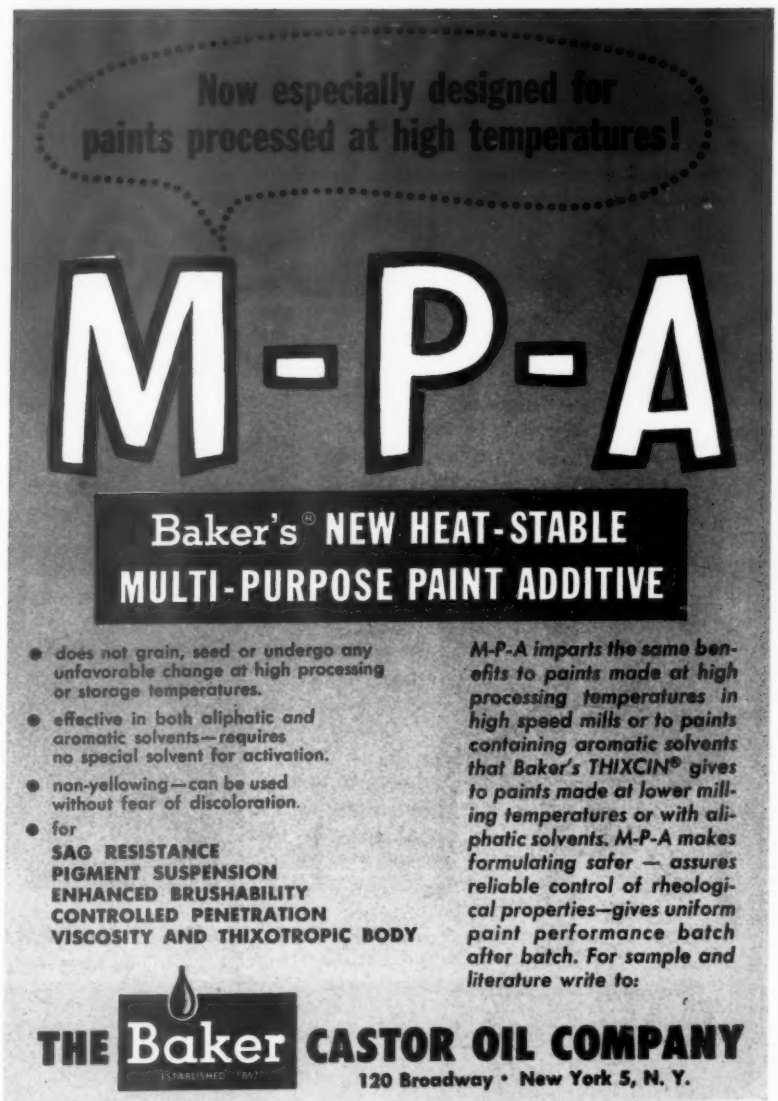
The Mantrose Corp., Brooklyn, N. Y., manufacturers and bleachers of shellac, has acquired the Attleboro Manufacturing Corp., Attleboro, Mass., it was announced by M. A. Rosen, president of Mantrose.

Also, since February, the sales and executive staff of Dings & Schuster, Inc. has been affiliated with Mantrose. In discussing these new acquisitions, especially the modern, extensive bleaching plant in Attleboro, Mass., Mr. Rosen said that his company will now be better able to meet its greater production need.

•

Columbian Carbon Offices

Carl E. Kayser, president of Columbian Carbon Co., broke ground last month for the company's new Akron headquarters, located at 452 E. Market St. This new brick office-laboratory building is one of the company's first moves in an over-all expansion program undertaken since it assumed the sale of its own products last July.


Now especially designed for paints processed at high temperatures!
M-P-A
Baker's® NEW HEAT-STABLE MULTI-PURPOSE PAINT ADDITIVE
• does not grain, seed or undergo any unfavorable change at high processing or storage temperatures.
• effective in both aliphatic and aromatic solvents—requires no special solvent for activation.
• non-yellowing—can be used without fear of discoloration.
• for
SAG RESISTANCE
PIGMENT SUSPENSION
ENHANCED BRUSHABILITY
CONTROLLED PENETRATION
VISCOSITY AND THIXOTROPIC BODY
M-P-A imparts the same benefits to paints made at high processing temperatures in high speed mills or to paints containing aromatic solvents that Baker's THIXCIN® gives to paints made at lower milling temperatures or with aliphatic solvents. M-P-A makes formulating safer — assures reliable control of rheological properties—gives uniform paint performance batch after batch. For sample and literature write to:
THE Baker CASTOR OIL COMPANY
120 Broadway • New York 5, N. Y.

Ross HEAVY DUTY PAINT MIXERS

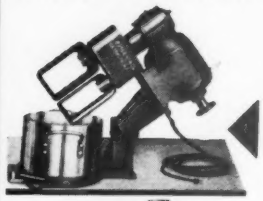
The latest Ross Paint Mixers are designed to give BETTER MIXING IN LESS TIME.

The RUGGED HEAVY DUTY CONSTRUCTION built into every Ross machine assures dependable trouble-free operation.

#130 CDM—165 gal. Double Motion Change Can Mixer. 60, 80, 130 and 165 gal. sizes. Stirrer action provides 12 intense compressive and shearing actions during each revolution of stirrers around can.

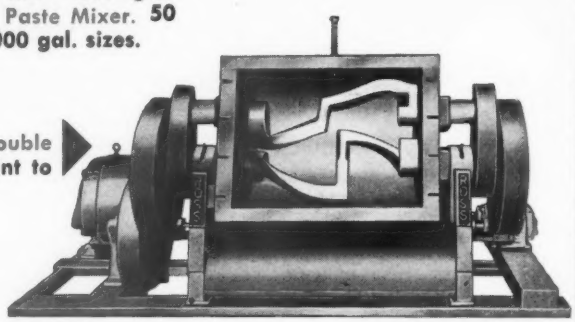
#36 RM — 500 gal. Semi Paste Mixer. 50 to 1000 gal. sizes.

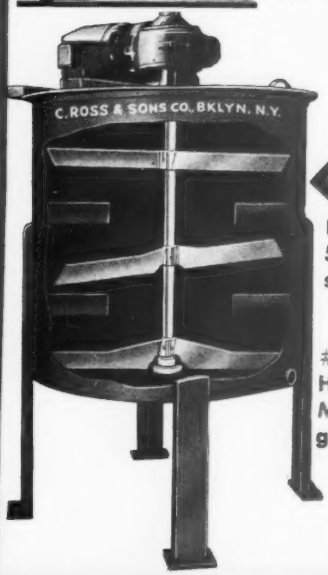
#30 C — 60 gal. Change Can Mixer. 8, 16, 20, 50 and 60 gal. sizes.



#130 EL—1 gal. Variable Speed Change Can Mixer. 1 or 2 gal. sizes.

#41 L — 150 gal. Double Arm Kneader. 1 pint to 150 gal. sizes.





#36 — 500 gal. Liquid Mixer. 50 to 2000 gal. sizes.

#132 — 100 gal. Heavy Duty Paste Mixer. 50 to 150 gal. sizes.

#131 AB — 250 gal. Change Tank Mixer. 150 to 250 gal. sizes.

WRITE FOR COMPLETE INFORMATION!

CHARLES ROSS & SON COMPANY, INC.

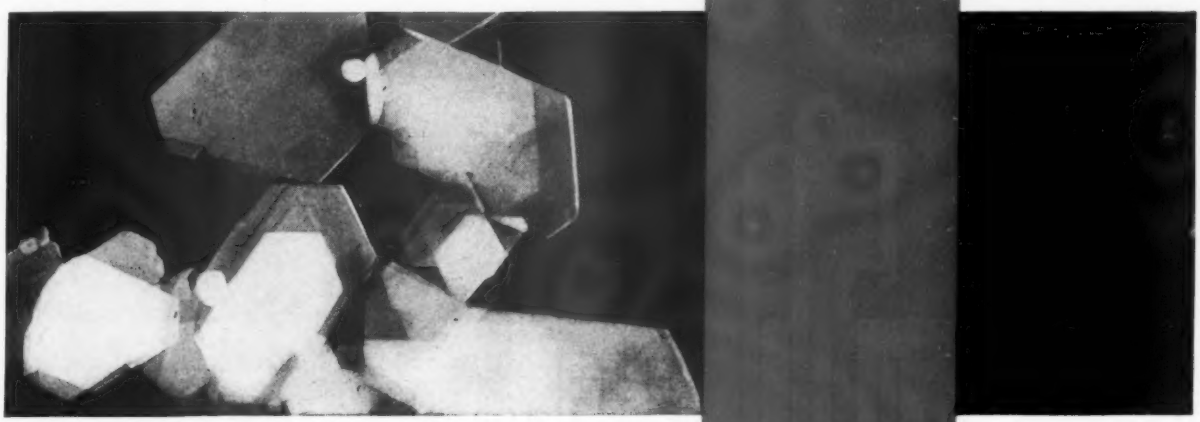
ESTABLISHED 1869

148 CLASSON AVENUE BROOKLYN 5, N. Y.

ASP
ALUMINUM SILICATE PIGMENTS

UNIQUE INERTS THAT IMPROVE YOUR PRODUCTS

Picture of perfection in LATEX *formulations*



Edgar ASP 400

There are down-to-earth reasons why EDGAR ASP 400 is the most widely used inert in latex systems.

Chemically Stable—EDGAR ASP 400 is thoroughly compatible in latex formulations. Due to special, patented processing, trouble-making water-soluble ions have been removed. It is wholly compatible with the latex, and blends perfectly with other pigments.

Physically Ideal—Only the best of the plate-like crystals that you see above qualify for ASP 400. Close control over particle shape and size gives your products superior performance. ASP 400 is soft, non-abrasive.

Summing Up—ASP 400 will give you a superior line of latex paints, hence a competitive edge. Your advantages are spelled out in reduced dispersion time, easier formulation, lower costs, desirable flow, improved workability, smooth "ghost"-free finish—all at no risk of breaking down your latex systems.

Across-the-board—ASP 400 is just one of a large family of EDGAR aluminum silicates, one of which may be ideal for the paint system *you* have in mind.

For You—Full Data . . . Sample Drums. Just check your needs and mail the coupon. No obligation, of course.

Edgar **EDGAR PRODUCTS** *from . . .*

MC Always A Better Way

MINERALS & CHEMICALS CORPORATION OF AMERICA

34 ESSEX TURNPIKE, MENLO PARK, NEW JERSEY

SERVING OVER 750 PAINT MANUFACTURERS FROM WAREHOUSE STOCKS IN 28 CITIES

MINERALS & CHEMICALS CORPORATION OF AMERICA
34 Essex Turnpike, Menlo Park, N. J.

Please send me:

- ☐ Complete, up-to-date technical literature.
- ☐ Sample drum of ASP 400 ☐ 2 lb. ☐ 5 lb. ☐ 10 lb.
- ☐ Sample drum of ASP product(s) for _____ paint system.

name _____ title _____

company _____

address _____

city _____ zone ____ state _____

For the

WIDEST VARIETY

of Particle Sizes

HORSE HEAD LEAD-FREE ZINC OXIDES

Recommended for	Finest	Medium		Med. Large	Large	Acicular
	KADOX-515	XX-2	XX-55	XX-50	XX-503	XX-601
Gloss Retention in Enamels	✓					
Washability in Alkyd Flats	✓					
Non Yellowing of Gloss Enamels	✓	✓	✓	✓		✓
Durability of outside House Paints		✓	✓	✓	✓	✓

WE SHALL BE GLAD TO ASSIST YOU—

in determining which Horse Head Zinc Oxide is best for you.

THE NEW JERSEY ZINC COMPANY

FOUNDED 1848

Products Distributed by

THE NEW JERSEY ZINC SALES COMPANY

HORSE HEAD PRODUCTS

NEW YORK 38, N. Y. 160 Front Street

BOSTON 11, MASS. 139 Kneeland Street

CHICAGO 1, ILL. 221 North La Salle Street

CLEVELAND 14, OHIO National City Bank Building

OAKLAND 4, CAL. 95 Market Street

LOS ANGELES 21, CAL. 2424 Enterprise Street

NEW MATERIALS — EQUIPMENT

VALLEY CRAFT

DRUM TRUCK
For Heavy Drums

"Ezy-Rol Barrel Cart," a drum and barrel truck, is said to make it possible for one operator to easily place heavy drums on pallets. Manufacturer states that the design of this cart allows the truck's shoes to be placed on edge of the pallet so that in one forward motion the drum can be elevated to the pallet with a minimum of operator effort. It is also said that drums can be safely lowered from pallets with this cart.

Another feature claimed for this cart is its spring operated chime hook which drops over the barrel edge as the truck is moved against the barrel without the operator touching either the hook or the barrel.

Main frame of barrel truck is constructed from heavy steel tubing with a 1" diameter axle. It is also available in aluminum where light weight is a factor such as in delivery service. Valley Craft Products, Inc., 770 Jefferson Ave., Lake City, Minn.

RIBBON MIXERS
Heavy-Duty

A new line of heavy-duty ribbon type mixers are said to be suitable for processing mixes of dry powders, crystalline materials, dry colors, and for cutting fats, oils or shortening into dry flour or powders.

Six different agitator designs are available with the mixers. Included are special agitators to provide end or center discharge of the mix,

Write

for Catalogs 73 and 77
for Complete Data on
BALL MILLS • PEBBLE MILLS
JAR MILLS • JAR ROLLERS

If you carry on pulverizing, wet or dry grinding and/or mixing of chemicals, drugs, cosmetics, printing inks, coatings, paints, lacquers, minerals, etc., you will find these catalogs useful working tools for your files. They give complete details on the Abbé Engineering series of mills for every range of work from small batch jobs to full scale plant production.

These are the mills that have stood the test of time. The ability of Abbé Engineering to help plan their use, as a result of long years of experience with these mills, is a vitally important factor. Sturdy construction and sound design insure long service life and the lowest over-all operating costs.

WRITE FOR CATALOGS TODAY!

ABBÉ ENGINEERING COMPANY
50 Church Street • New York 7, N. Y.
Address Department 64

Investigate new Oronite Isophthalic

FOR SUPERIOR BAKING FINISHES

Consider these advantages of Isophthalic based baking resins!

1. Greater Hardness An Isophthalic based resin produced a hardness of 50% of glass as compared to a phthalic anhydride resin which gave less than 35% of the hardness of glass.

2. Thermal Stability A leading resin manufacturer has indicated that Isophthalic resins are approximately 40 times as stable to heat as comparable phthalic anhydride resins.

3. Greater Gasoline Resistance Tests have shown excellent resistance of Isophthalic baked enamels to mineral spirits and xylenes.

4. Greater Alkali Resistance This suggests Isophthalic resins for better water emulsion formulations.

For further information on this totally new raw material contact the Oronite office nearest you.

ORONITE CHEMICAL COMPANY

ORONITE CHEMICAL COMPANY

EXECUTIVE OFFICES: 200 Bush Street, San Francisco 20, California

SALES OFFICES

450 Mission Street, San Francisco 5, Calif. — 714 W. Olympic Blvd., Los Angeles 15, Calif.
30 Rockefeller Plaza, New York 20, N. Y. — 20 North Wacker Drive, Chicago 6, Illinois
Carew Tower, Cincinnati 2, Ohio — Mercantile Securities Bldg., Dallas 1, Texas
26 Avenue William-Favre, Geneva, Switzerland

"Tee-head" agitators for reducing lumpy type mixes, and a "cut-it-in" type agitator for shortening blending.

There are eight mixers in the new line ranging from 25 to 450 gallon capacity. Heavy duty stuffing boxes, rigid outboard bearings, geared head motor, guarded chain and sprocket drive, and hand operated shut off valve are among other features of the units. The Cincinnati Hildebrand Company, Inc., 3416 Beekman St., Cincinnati 23, Ohio.

MODIFIERS
For Latex Paints

Piccopale A-1 Emulsion is claimed to give latex paints outstanding resistance to soap, water and alkalies, and provides other advantages that appeal to manufacturers and buyers of both industrial paints and shelf goods. Company says that other advantages to latex paint manufacturers gained through the use of the modifier are: it is compatible with thickeners and protective colloids; it has excellent package stability and is non-creaming at 50% and 10% of solids; it is of uniform particle size—under 1.0 micron. Paint users will find, the company says, that addition of the modifier permits easy removal of soil, permits permanent film flexibility, improves initial adhesion, and it has early water resistance. Pennsylvania Industrial Chemical Corp., Clairton, Pa.

UNSATURATED ALCOHOLS
Varied Uses

"Unadol 40" and "Unadol 90," unsaturated alcohols with two or more double bonds and one hydroxyl group, are now available in tankcar quantities.

The new fatty alcohols are non-corrosive, almost water-white liquids derived from domestic vegetable oils such as linseed oil and soybean oil, according to the company. They are oily liquids that resemble in appearance the oils from which they are derived, although they have less odor and are lighter in color.

The principal component of "Unadol 40" is linoleyl alcohol which possesses two double bonds. The principal component of "Unadol 90" is linolenyl alcohol which possesses three double bonds. Successful product advantages are said to be very likely in manufacturing new protective coatings, resins, surface active agents and chemicals. Archer-Daniels-Midland Co., Chemical Products Div., 2191 W. 110 St., Cleveland 2, Ohio.

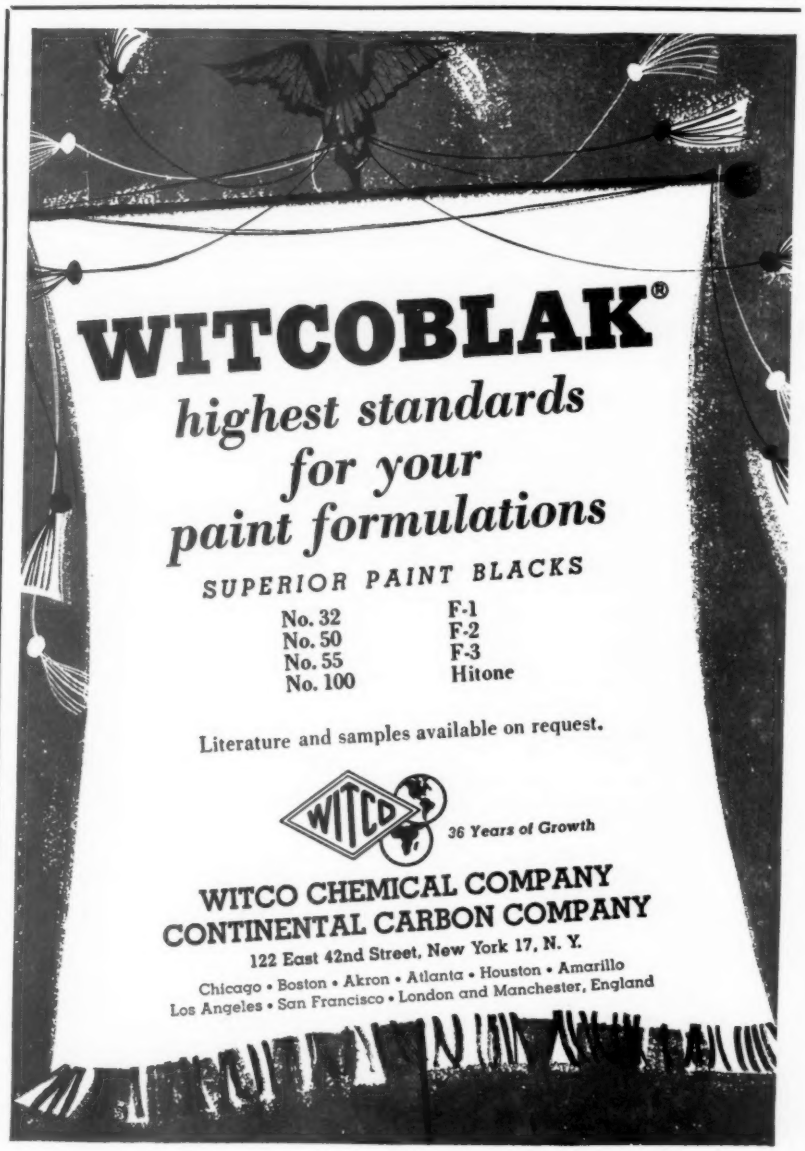
PAINT CAN
For Water-Base Paints

Company says it has developed an "Outward Curl" can for water-base paints which provides vital corrosion protection through full enamel coating of the entire can interior. Can will be made in quart and gallon sizes. To the paint manufacturer, this means six to nine months longer shelf life, elimination of raw metal inside the can and complete enamel protection with perfected coatings, according to the company.

This is claimed to be an important packaging advancement for polyvinyl acetate and latex base paints which are more corrosive than oil base paints, since the new can is expected to provide the increased corrosion protection needed by these water-base paint products. Continental Can Co., 100 E. 42 St., New York 17, N.Y.

PLATECOILS
Serpentine Construction

A new line of Platecoils featuring



Every day for 36 years the records have been taken at National Lead's Experimental Test Station, Sayville, L. I. . . . the weather, hour-by-hour . . . solar radiation . . . the chemistry of the air . . . the condition of thousands on thousands of paint samples. Today, on 2½ miles of test fence, more than 30,000 exposure tests are active.

FOOLPROOF

your exterior paints with Dutch Boy® "45X"

(Basic Silicate White Lead)

Want an extra leeway of safety against complaints? . . ."Use lead," say makers of exterior paints.

But thousands of exposure panels at Sayville, National Lead's Experimental Station go one step further. They *prove* you need lead for *uniform* performance. Prove, too, that "Dutch Boy" Basic Silicate White Lead "45X" *assures* uniform performance . . . makes exterior paints virtually foolproof, able to handle wide variations in application and service conditions.

In white House Paints, for instance, "45X" insures good self-cleaning. Preserves film integrity, as well.

In tinted House Paints, Dutch Boy "45X" increases film durability and maintains color uniformity.

In Primers, "45X" strengthens adhesion . . . helps keep the bond strong by resisting water.

Paint after paint, it's the same story . . . uniform performance . . . fewer complaints. With "45X," the time and cost of answering complaints goes down. Talk against your paints . . . talk you may not hear . . . fades away. Good will, repeat business comes your way.

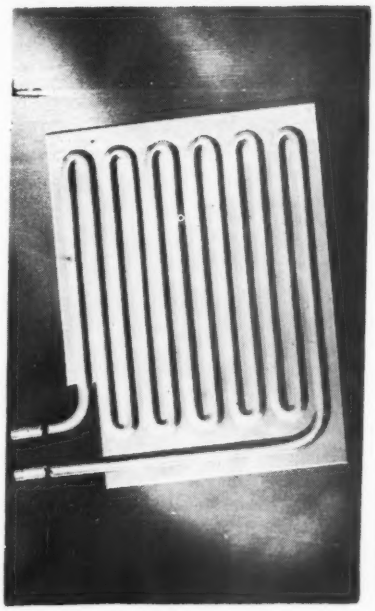
Cost is lower, too

You actually need fewer pounds of "45X." For in "45X" the reactive portion of each pigment particle is concentrated at the surface. Pound for pound, *more* lead is available than in other white leads.

No question about it. If you want to cut complaints, step up quality and save money, "Dutch Boy" Basic Silicate White Lead "45X" is the lead to use in exterior paints.

National Lead Company: New York 6; Atlanta; Buffalo 3; Chicago 80; Cincinnati 3; Cleveland 13; Dallas 2; Philadelphia 25; Pittsburgh 12; St. Louis 1; San Francisco 10; Boston 6 (National Lead Co. of Mass.). In Canada: Canadian Titanium Pigments Ltd., 630 Dorchester St., W., Montreal.

NEW MATERIALS — EQUIPMENT



TRANTER

Serpentine construction and "at-the-top" connections is now available. The right-angle inlet and outlet fittings on the Style 50 Platecoils are said to make them especially suitable for use in open top tanks. They can be quickly hung in position, with all threaded connections above the solution level, permitting quick, easy removal for cleaning or inspection without draining the tank, according to the company. The Serpentine layout of the channel provides continuous, in-line flow of the heating or cooling media. Available in 18″ or 22″ widths, and in lengths from 23″ to 119″. Over-all thickness is 7/8″. Metals available are: cold-rolled steel, stainless steel and other alloys for corrosive solutions. Tranter Manufacturing, Inc., Platecoil Div., Lansing 4, Mich.

INFRA-RED HEATER
Eliminates Splatter

The Economy Heater, for drying and evaporation, is said to have a unique multi-directional Castaloy clamp and socket. When the heater is attached to a support rod, heat from the 250-watt infra-red bulb can be aimed horizontally through 360°, vertically through 300°, according to the company. In addition, it is claimed the lamp can be raised or lowered on a support stand to give the desired amount of heat as well. The heater comes complete with bulb, socket, clamp, cord and plug for use on 115-volt a-c and d-c. Fisher Scientific Co., 384 Fisher Building, Pittsburgh 19, Pa.

FLASH TESTERS
130—450 Degree Range

Company has redesigned the Pensky-Martens Flash Testers, offered in both electrically-heated and gas-heated models. Made for accurate, efficient determinations of flash points of fuel oils, crude petroleum, lubricating oils, gas oils, cutback asphalts, and animal, vegetable and marine fats and oils flashing in the 130° - 450° F. range, the testers are also said to be suitable for testing many similar products. The testers conform with specifications of the ASTM, AOCS, U. S. Government and British Institute of Petroleum Technologists.

Stepless heat control is a claimed feature of both flash testers, achieved in the electric model by use of an autotransformer with a calibrated reference dial, and in the gas model by an adjustable Meker-type burner. Precision Scientific Co., 3737 W. Cortland St., Chicago 47, Ill.

LESS THAN
1¢
A GALLON
That's all it costs to remove the odor from your paint with Maskit #2
• Makes your paint more acceptable to painters and home owners.
• Masks the odor in the can and while paint is being applied . . . as well as during – and after – the drying period.
• Does not affect drying time or color durability.
• Amazingly economical . . . use 1 lb. of Maskit #2 to 150 gallons of paint.
MASKIT #2 is equally effective in paints, lacquer thinners, varnishes and other similar types of products. Order a trial pound today!
$1.50 lb.
AROMATIC PRODUCTS, INCORPORATED
235 FOURTH AVENUE, NEW YORK 3
CHICAGO • DALLAS • MEMPHIS • PITTSBURGH • LOS ANGELES • BOSTON

1955 REVIEW OF THE PAINT INDUSTRY

●

The Latest
And Most
COMPREHENSIVE
REFERENCE
On Paint
TECHNOLOGICAL
DEVELOPMENTS
Is Contained
In This
164 Page Volume

●

Also Includes
Up-To-Date Directories
of
Suppliers of Raw
Materials and Equipment
and a
Trade Names
Directory

●

Get Your Copy Today!!

PRICE $3.50

Use Coupon Below
Make Checks Payable To
POWELL MAGAZINES, INC.
855 Ave. of Americas, N. Y. 1, N.Y.

POWELL MAGAZINES, INC.
855 Ave. of Americas, N.Y. 1, N.Y.

Enclosed is check for $_____, send ___ copies, 1955 Review of the Paint Industry.

NAME .....

FIRM .....

ADDRESS .....

CITY .....

NEWS

Dr. Hans Beller Manager Of New Acetylene Plant

The new high pressure acetylene products plant of General Aniline & Film Corp. at Calvert City, Ky., will be operated by the company's dyestuff and chemical division.

Dr. Hans Beller, regarded as one of the foremost authorities in this new field of chemistry in this country, has been appointed manager of the plant.

Dr. Beller has been associated with General Aniline's acetylene products program almost since its inception. He came to the company in 1941 and played a leading part in the construction and operation of the Linden pilot plant.

In commenting upon General Aniline's progress with its high pressure acetylene program, Dr. Beller recently stated: "The high reactivity of acetylene under pressure makes it perhaps the most versatile tool available to the organic chemist. . .for this reason it is impossible to predict with much hope of accuracy the full extent to which acetylene derivatives may contribute to the future economy. Not even with the remarkable progress to date can there be any solid forecast of the future possibilities."

ASTM Nuclear Committee

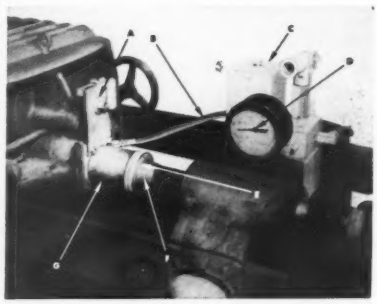
Standards for materials and for testing of materials used in nuclear energy development, particularly in the construction of reactors, will receive special attention from the American Society for Testing Materials.

A Special Administrative Committee on Nuclear Problems, organized by the Society, has as its scope: to advise the technical committees of the Society on nuclear problems pertinent to their respective scopes; to stimulate the undertaking of research and standardization projects, specifically related to nuclear energy, on the part of the technical committees; to review periodically the status of the work.

HYDRO-LOCK

THE NEW HYDRAULIC FILTER PRESS CLOSER

Converts any manually operated filter press to hydraulic operation *in less than one hour;* enables repeated closing to a uniform pressure; no opening space in the press is sacrificed to accomodate the Hydro-Lock.



A-MOUNTING BRACKET
B-CONNECTING HOSE
C-PUMP
D-GAUGE
E-LOCK RING
F-PISTON
G-HYDRAULIC CYLINDER

Designed for long wear and safe "one-man" operation, the Hydro-Lock modernizes out-moded manually operated presses.

The NEW HYDRO-LOCK is made in sizes from 20 tons through 120 tons to meet your specific requirement. FREE TESTING SERVICE is available, please write for details.

MANUFACTURED BY
BIACH INDUSTRIES, INC.

iBi

10 INDIAN SPRING ROAD
CRANFORD, N. J.

NEWS

Patent Given S. N. Hunter For New Paste-Pigment

The United States Patent Office after a seven-year investigation, has granted a patent to S. N. Hunter for a new paste-pigment, or base, for paint. Mr. Hunter is board chairman of Chemical Sealers, Inc., Belleville, Ill.

According to the company, the multiple paste pigments, metallic and non-metallic, will have a profound effect wherever there is a need for paint, varnish, lacquer or liquid sealing and finishing products.

The new paste pigment involves use of liquid chlorinated polyphenyl, and is claimed to have a number of distinctive advantages over all previously existing paint, varnish, and sealer bases such as oil (linseed oil-turpentine base) and latex (rubber base). CPC is the registered trade name.

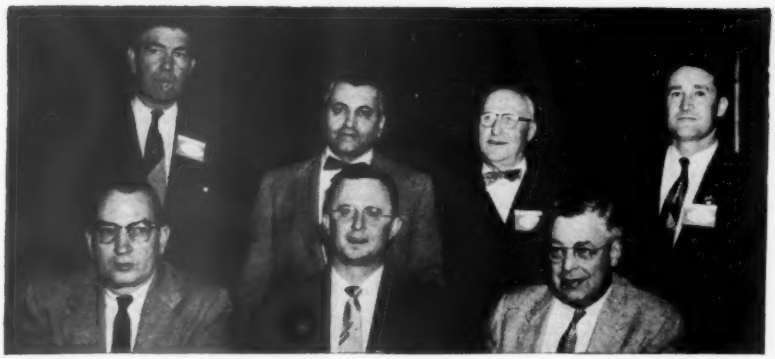
•

Raw Materials Discussed By Reichhold Official

A chemical company contemplating manufacture of its own raw materials cannot base its decision only on savings to be effected, but on whether or not the money could be more profitably used in another area of operations, Theodore S. Hodgins, vice president in charge of research and development of Reichhold Chemicals, Inc., told the 12th annual meeting of the Commercial Chemical Development Association. The meeting was held recently at the Hotel Statler in New York City.

Mr. Hodgins' talk was titled "Raw Materials—Make or Buy." He said that basic chemical manufacture must always be on a scale large enough to be economical and yet not so huge as to necessitate the creation of new marketing facilities and staff to dispose of any surplus not used by the company.

Two other criteria in determining the advisability of expansion in raw material manufacture are transportation logistics and company policy, he asserted.



TOP OFFICIALS: Officers of the Painting & Decorating Contractors of America, elected at the recently concluded 72nd National Convention of PDCA in Washington, D.C., are (l to r), front row: Vice President Leon Switzer, President Ray N. Elvart, and Vice President Raymond Reynolds. Back row (l to r), Vice President Lee Singleton, Chairman Ways & Means Committee Ben Benjamin, Treasurer John Burns, and Vice President Lee Wiscomb.

To retain its original high quality, your product must be *packaged to protect its quality!*

Every Vulcan Pail and Drum is *precision made of quality steel to protect your product* against shipping hazards. Every Vulcan Pail and Drum is *individually inspected and tested* — Vulcan's Hi-bake Lining is *guaranteed to protect your product* from physical or chemical change due to contact with its container.

Vulcan containers are available in all styles, and sizes 1 to 20 gallons. Open Head Lug-covers and Closed-Head. SERVICE-PROVEN FOR HARD-TO-HOLD CHEMICALS!

Vulcan will reproduce your present trade mark or design a new one for you. Lithographed in non-mar, permanent-finish, full-colors, *your name — your trade mark — your slogan can be your best salesman!*

OVERNIGHT SERVICE. Sales offices and warehouses in principal cities. Write or wire for detailed information and prices.

VULCAN is LARGE ENOUGH to supply your Drum and Pail needs — yet SMALL ENOUGH *to give personalized service to all Vulcan Customers.*

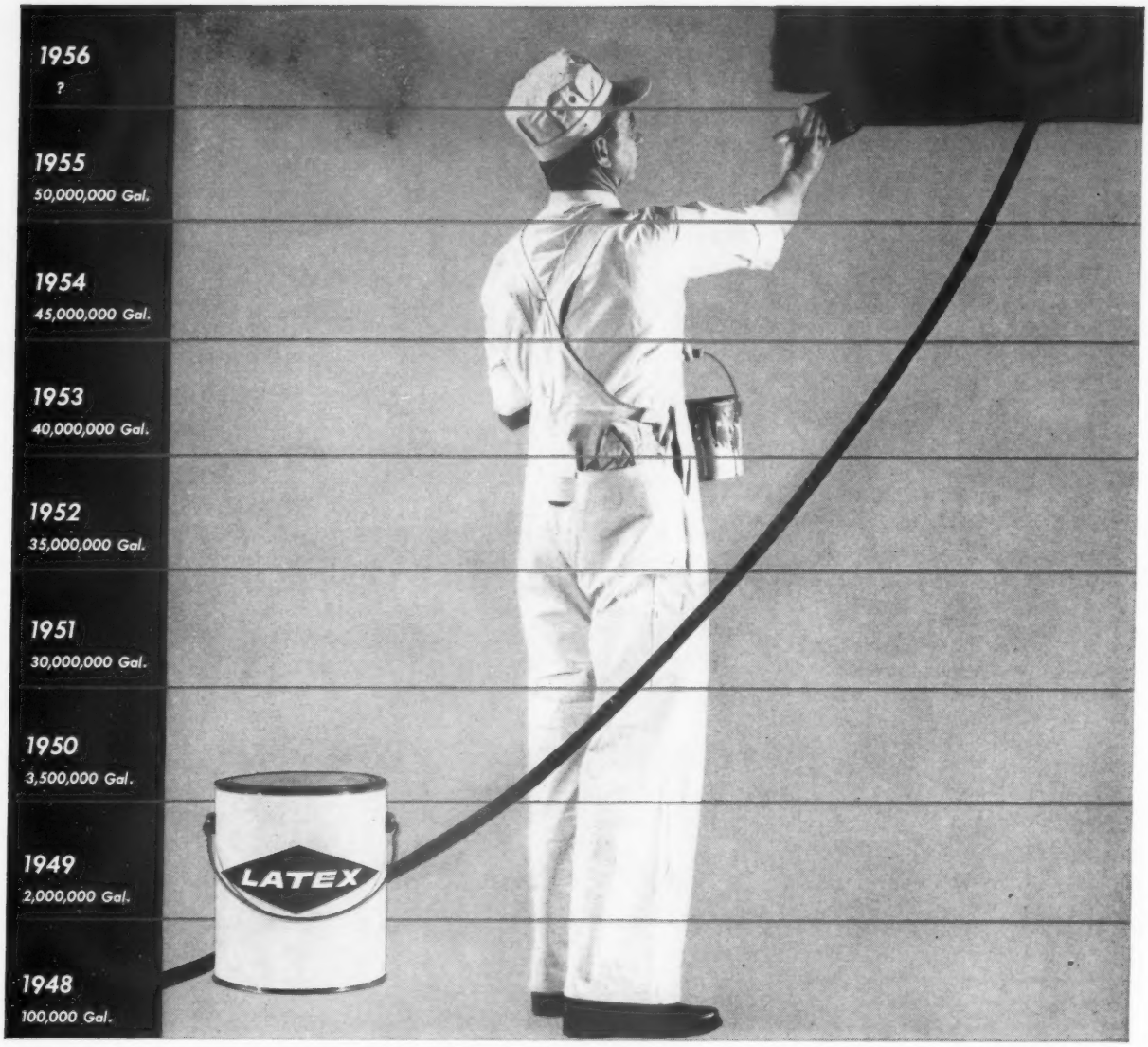
AN INDEPENDENT SOUTHERN COMPANY
SERVING SOUTHERN INDUSTRY

VULCAN

STEEL CONTAINER COMPANY

MAIN OFFICE AND FACTORY

3315 N. 35 Ave., Birmingham, Ala., P. O. Box 786



Newcomers in 1948, latex paints have taken the country by storm. In 8 years, their phenomenal climb in sales has surprised even the experts.

Latex paint sales increased 500 times

No other paints have ever caught the fancy of Mr. & Mrs. America like latex paints. In 1948, 100,000 gallons were sold. In 1955 sales were 50 million gallons . . . 500 times as great! Only television sets and antibiotics can match this phenomenal growth in sales! Five years ago 41 out of 50 latex paint manufacturers produced less than 5,000 gallons annually. Now 47 of these 50 produce over 1,000 gallons every day. 14 produce over 500,000 gallons a year. How's that for sales increase!

And the future for latex paints is golden, too. They not only win thousands of new "do-it-yourself" customers every year, but more and more professional painters, decorators, architects and maintenance men are using them. If you don't presently have a latex paint in your line, here's your opportunity to build business . . . make a latex paint. Dow Coatings Technical Service, backed by years of experience, will be glad to help you develop your formulations. THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. PL562L

LATEX T. M.

you can depend on DOW PLASTICS

DOW

PERSONNEL CHANGES

Zirpolo

Brown

Larson

DEWEY & ALMY CHEMICAL CO.

Sadler

GLIDDEN

DEWEY & ALMY: Assignment of three organic chemical salesmen to central and eastern territories has been announced as follows: **Alexander T. Zirpolo** will represent the company in Ohio, West Virginia, Kentucky, eastern Indiana, and part of Michigan. . .**M. Barclay Brown, Jr.** has been assigned to New York state and New Jersey. . .**Carl E. Larson** will cover a territory in New York City and Long Island, N. Y.

GLIDDEN: Joseph Sadler has been appointed to the newly created staff position of technical consultant to the paint division and will provide technical assistance to industrial paint accounts. His service will be available to all company divisions through the national industrial sales headquarters in Cleveland, Ohio.

REARDON: William O. Stevens has been appointed production manager of the St. Louis manufacturing division. . .**Robert G. O'Connor** becomes sales representative in eastern Tennessee, including Chattanooga, Knoxville and Nashville.

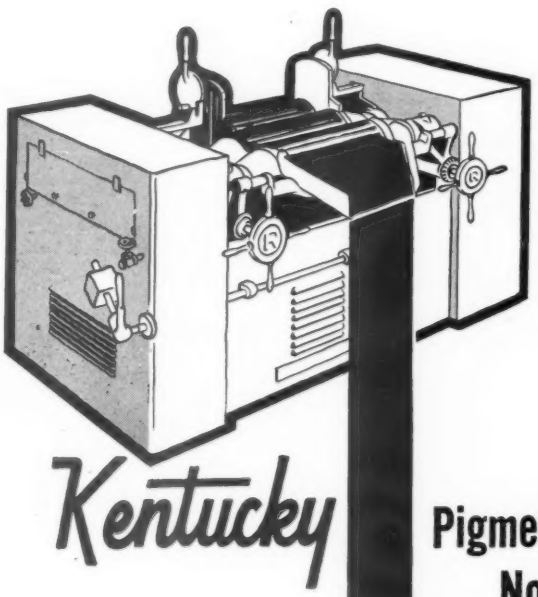
ATLAS POWDER: E. John Caruso has been appointed assistant manager of the chemicals division regional sales office in Chicago. . .**Paul E. Stubbe,** technical representative in the chemical sales office in Dallas, Texas, has been transferred to St. Louis to succeed Mr. Caruso.

COLUMBIAN CARBON: Roy T. Cucullu has been appointed agent in the New Orleans area for the line of mapico synthetic iron oxide colors, and rubber, paint, ink and other carbon blacks. He will cover, specifically, Louisiana, Mississippi and Mobile, Alabama.

BARRETT DIVISION: John C. Esher has been appointed assistant sales manager of the chemical sales department. He will be in charge of plasticizers, naphthalene, resins and other coal-tar chemicals. . .**J. E. Shand** has been appointed assistant to **L. W. Miller,** manager of chemical sales. Mr. Shand has been assistant sales manager since 1954. . .**Dr. Dale E. Mancuso** has joined the research and development department staff at the Glendale Plaskon Laboratory.

CROWN CORK & SEAL: Ves Hoffman has been appointed St. Louis district sales manager and will be responsible for the sale of the company's complete product line, including crowns, closures, cans and machinery.

COWLES CHEMICAL: Frank F. Black has been named manager of the newly established organic chemical department. His immediate responsibilities will include the sale of silicone compounds for water repellant treatment of masonry.



Kentucky

Pigment Green B No. 3890

WIDE BLENDING RANGE

For an excellent range of interior greens, blend Green B No. 3890 with Chrome Yellows for alkyd flats, and with Hansa Yellows for all emulsion paints.

May we tell you more about Green B No. 3890, its advantages and its economies.

This versatile green pigment features High Hiding Power, Tinting Strength, Alkali Fastness and Good Package Stability. But, best of all, it works well in both alkyd and emulsion paints.

Kentucky Color AND CHEMICAL COMPANY, INC.
LOUISVILLE 12, KENTUCKY

where can you use these remarkable new

DOWANOLS

(Ethylene and Diethylene Glycol Ethers)

Can you use the high solvent power of Dow's new Dowanols? Can you benefit from the prevention of blush or orange peel. . .from the better flow-out and adhesion Dowanols impart to lacquers, inks, enamels, and varnishes. . .from increased penetration given to dyes. They are effective as mutual solvents and coupling agents for mixtures containing water and water-insoluble organic chemicals.

	Dowanol 7	Dowanol 8	Dowanol 10	Dowanol 16	Dowanol 17	Dowanol 19
Chemical Name	Ethylene Glycol Methyl Ether	Ethylene Glycol Ethyl Ether	Ethylene Glycol n-Butyl Ether	Diethylene Glycol Methyl Ether	Diethylene Glycol Ethyl Ether	Diethylene Glycol n-Butyl Ether
Specific Gravity @25/25°C.	0.963	0.9275	0.899	1.018	0.9855	0.952
Boiling Range 5-95% @760m.m.Hg °C °F	123-126 254-258	133-136 271-277	166-173 330-343	189-195 372-383	197-203 387-397	225-233 437-450
Viscosity CPS @25°C	1.532	1.838	2.83	3.467	3.780	4.92
Flash Point °F (COC)	125	110	160	210	205	225
Dilution Ratio: Toluol L.D. Naphtha	4.0 0.3	5.2 1.1	3.3 1.8	2.3	1.9 0.2	
Solubility	All Dowanols infinitely soluble in water and practically all commercially available solvents					

For further information and samples, call your nearby Solvents and Chemicals bulk plant.

AMSCO SOLVENTS & CHEMICALS CO.
4619 Reading Road — ELmhurst 1-4700
Cincinnati 29, Ohio

BUFFALO SOLVENTS & CHEMICALS CORP.
Box 73, Station B — Bedford 1572
Buffalo 7, New York

CENTRAL SOLVENTS & CHEMICALS CO.
2540 West Flournoy Street — SEeley 3-0505
Chicago 12, Illinois

DIXIE SOLVENTS & CHEMICALS CO.
Dixie Highway at Appleton Lane—EMerson 8-5828
Louisville 16, Kentucky

HOOSIER SOLVENTS & CHEMICALS CORP.
1650 Luett Ave. — MElrose 8-1361
Indianapolis 22, Indiana
Nelson Road East — Anthony 0213
Fort Wayne 8, Indiana

MISSOURI SOLVENTS & CHEMICALS CO.
419 De Soto Ave. — GArfield 1-3495
St. Louis 7, Missouri
2522 Nicholson Ave. — Chestnut 1-3223
Kansas City 20, Missouri

OHIO SOLVENTS & CHEMICALS CO.
3470 W. 140th St. — CLearwater 2-1100
Cleveland 11, Ohio

SOUTHERN SOLVENTS & CHEMICALS CORP.
917 Jefferson Highway, P. O. Box 4067
Carrollton Station — VErnon 3-4666
New Orleans 18, Louisiana

TEXAS SOLVENTS & CHEMICALS CO.
8501 Market Street — ORchard 2-6683
Houston 15, Texas
2500 Vinson Street — FEderal 5428
Dallas 12, Texas

WESTERN SOLVENTS & CHEMICALS CO.
6472 Selkirk Ave. — WAlnut 1-6350
Detroit 11, Mich.
Central Ave. at Reynolds Road — Jorden 0761
Toledo 8, Ohio

WESTERN SOLVENTS & CHEMICALS CO. (CANADA) LTD.
1454 Crawford St. — CLearwater 2-0933
Windsor, Ontario

WISCONSIN SOLVENTS & CHEMICALS CORP.
1719 South 83rd St. — GReenfield 6-2630
Milwaukee 14, Wisconsin

WOLVERINE SOLVENTS & CHEMICALS CO
1500 Century Ave., S. W. — CHerry 5-9111
Grand Rapids 9, Michigan

Solvents Chemicals Group Member

THE SOLVENTS AND CHEMICALS GROUP

2540 West Flournoy Street • Chicago 12, Illinois

Borland
WATSON-STD.

Meinert
COOK

Vyn

Aiken
RINSHED-MASON

Rothstein

Davis
LITTER

WATSON-STANDARD: Joseph V. Borland has been appointed vice president.

COOK PAINT & VARNISH: Kem Meinert has been appointed head of a new industrial maintenance and anti-corrosion research laboratory at the main office in Kansas City, Mo. He will also act as a liaison man, working with the sales staff in order to keep the research staff alert to the needs of industrial customers.

RINSHED-MASON: William Vyn, formerly industrial sales manager, takes over the Detroit sales territory vacated by the retirement of **William G. Haarz. . .Robert C. Aikin** succeeds Vyn as industrial sales manager.

EMERY INDUSTRIES: R. G. Kelso and **Richard H. Proctor** have joined the sales staff of the chemical division.

D. H. LITTER: Julius Rothstein, for the past five years in the laboratory engaged in formulation research and development, will serve the metropolitan New York sales area . . **.Richard H. Davis,** who will serve as sales coordinator, will service the metropolitan New York area after an intensive training period.

McCLOSKEY VARNISH: The appointment of new salesmen and reassignment of territories have been announced as follows: **S. E. Yarborough,** Columbus, Miss., for Mississippi and Alabama. . **.Robert E. Puryear,** Jonesboro, Ark., for Arkansas. . **.Milton A. Nelson,** New Orleans, La., for Wisconsin and the upper peninsula of Michigan. . . **A. V. "Dick" Brannon,** Chicago, Ill., for Lake and Cook Counties. . . **Francis W. Miller,** Peru, Ill., for all Illinois except Lake and Cook Counties.

FREEMAN CHEMICAL: Robert J. Winters has been promoted to assistant sales manager and will headquarter at the firm's general offices in Port Washington, Wisconsin . . **.Fred A. Jenson & Co.,** 510 N. Dearborn, Chicago, has been appointed to the sales staff as representative for Chicago.

GENERAL TIRE & RUBBER: Three new chemical sales agents in the paint manufacturing industry have been appointed: **Henry L. Grund, Inc.,** Bulkley Building, Cleveland 14, Ohio, will cover northern Ohio. . **.C. L. McGuire & Co.,** 900 Dumesnil St., Louisville, Ky., will cover central and southern Indiana and western Kentucky. . **.Van Horn Metz, & Co., Inc.,** with offices at 241 E. Elm St., Conshohocken, Pa., and 516 N. Charles St., Baltimore 1, Md., will cover eastern Pennsylvania, southern New Jersey, Maryland, and northern North Carolina.

EADERS of the American paint industry, like those represented above, supply a constantly increasing amount of *alkyd resin* paints for industry and home. These paints grow in popularity each year because they provide unusual durability, color retention, and adhesion—as well as easy brushing and fast drying.

Dependable supplies of uniform quality phthalic anhydride play an important part in alkyd resin paint production. That's why Pittsburgh Coke & Chemical is a key supplier for so many paint manufacturers.

As a *basic* producer, Pittsburgh can assure them (1) Reliable supplies from an integrated plant and (2) Assured purity, low color value and low maleic anhydride content, thanks to Pittsburgh quality control from coal to finished phthalic anhydride. Let us show you how you may be able to benefit from these advantages, too!

COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

Announcing the first **completely modern** oblong can...
the only **solderless** can with all these features!

NO-DRIP SPOUT
—another Canco "first." And the neck has an *outward* curl to eliminate raw inside edge.
CLINCHED NOZZLE
—this means no solder anywhere . . . no rust from flux splashes . . . a fully lithographed top.
CEMENTED SIDE SEAM
—pioneered by Canco, to replace solder. Permits full lithography all the way around the can.
FULL ENAMEL INSIDE
—100% enameling means 100% efficiency for hard-to-hold products.
STACKABLE
—small recess in bottom of can permits full "stackability" . . . more effective displays . . . easier and better to ship and store.
Here's another
CANCO "first"!

COME TO
CANCO
FIRST!

There's not another container on the market with *all* the features you see above. And yet every one is important if you want to market your product in a truly *modern* container.

It's another example of Canco's continuing policy of passing along to you the end result of more than fifty years' experience.

AMERICAN CAN COMPANY New York, Chicago, San Francisco

Rankin

Werner

COLTON CHEMICAL

Bice

ATLAS ELEC.

Beadell

ADM

Thulin

ADM

Bidlack

ADM

COLTON CHEMICAL: Travis Rankin has been appointed technical service representative in the far west and Rocky Mountain regions. He will headquarter in California. . . **Sondol E. Werner,** with headquarters in Newark, New Jersey, will represent the company in the east coast.

ATLAS ELECTRIC DEVICES: John K. Bice Co., 440 Seaton St., Los Angeles 13, Cal., will represent the company in southern California. . . **Pacific Coast Chemicals Co.,** 2060 Third St., Berkley 10, Cal., will be representative in northern California.

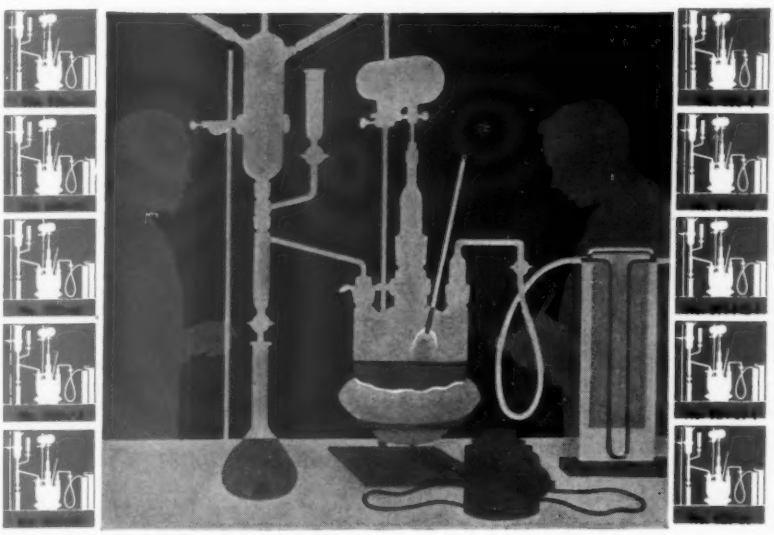
ARCHER-DANIELS-MIDLAND: Dr. George Nelson, director of the recently formed department has announced the following additions to the staff: **Donald A. Beadell** has been appointed manager of industrial chemicals development. . .**Dr. Verne C. Bidlack, Jr.,** will work with resins and placticizers. . .**Walter Thulin** has been assigned to agricultural products.

NATIONAL STARCH PRODUCTS: S. F. Thune, vice president and manager of the midwest division, has been promoted to sales vice president of the national adhesives division, with headquarters in the New York executive offices. . .**Frank Murphy,** manager of the Pacific Coast division, replaces Thune as manager of the midwest division. . .**R. A. DeWolfe,** New York adhesive sales supervisor, has been promoted to manager of the Pacific Coast division. . .**Larry Horan,** midwest supervisor of paint and related resin sales, has been promoted to supervisor of the New York Adhesive sales district.

BODY BROS.: Glenn H. Shakley has been appointed treasurer. He was associated for the past five years as budget controller of Pesco Products Division of Borg-Warner Corporation.

HILTON-DAVIS: Charles W. Fletcher has been made technical sales representative and will call on manufacturers in southern Ohio, Kentucky and Indiana.

PITTSBURGH PLATE GLASS: Robert E. Hawes has been appointed manager of the Worcester, Massachusetts, service branch succeeding **Thomas J. Higgins** who recently retired after 40 years of active service with the firm. . .**Theodore E. Culler** has been appointed to the newly created post of assistant manager of operations of the merchandising division. Prior to this appointment, Mr. Culler had served as manager for the Baltimore, Maryland, distributing branch during the past year.



The more "cooks" the better!...

Let Heyden technical service help in your PE applications

Resins by the hundred have been cooked in our applications laboratory to provide data on the formulation, processing, and properties of pentaerythritol alkyds and other resins. This is an important part of Heyden's service and development work on PENTEK (pentaerythritol, technical) and its companion polyhydric alcohols.

Such information is available to you at all times from our technical and sales staffs. It could help you to convert a resin problem into a profitable product. Just call your nearest Heyden representative and tell him how he can be of service in your particular polyol application.

PENTEK® *... the best known name in pentaerythritols*

Monopentek®• Dipentek®• Tripentek®• Pentaerythritol, Nitration Grade

HEYDEN
CHEMICAL CORPORATION
342 Madison Avenue, New York 17, N.Y.
CHICAGO • CINCINNATI • DETROIT • PHILADELPHIA • PROVIDENCE • SAN FRANCISCO

TME®
(Trimethylolethane)
For short and medium oil alkyds and for polyesters used in isocyanate resins.

METALS DISINTEGRATING: Harold F. Collins has been appointed vice president in charge of sales. He has been a vice president of the company since 1953, and has been in charge of sales of the metal pigments and metal abrasives divisions where he has directed the selling activities of aluminum pastes and powders, gold bronze powders, and harrison shot and grit. In addition, in his new post, Mr. Collins will also be responsible for the marketing activities of metal powders and the products of the alloys division, located on the West Coast.

H. F. Collins

GARLAND: Matt J. Mericle has been appointed vice president of industrial maintenance sales. He will be in charge of expanding the company's sales districts and divisions for the entire country.

UNION CARBIDE: R. D. Glenn has been appointed assistant works manager. . .**F. H. Belden** has been named general superintendent and **R. C. Hieronymus** a superintendent of the south Charleston, West Virginia plant . . .**H. A. Stuewe** has been appointed assistant superintendent of the plant at Texas City, Texas. . .**R. L. Duncan, F. J. Rauscher** and **E. R. Young** have been appointed assistant sales managers.

VULCAN CONTAINERS: Gerald J. Fahey has been named sales representative and will represent the company in the greater Detroit area contacting manufacturers of paint, chemicals, adhesives, printing inks, food and petroleum products. Prior to establishing himself as a manufacturers' representative, Mr. Fahey was purchasing agent for the Detroit Adhesives and Coatings Division of the Minnesota Mining and Manufacturing Co., a position he had held since 1944.

G. J. Fahey

GENERAL ELECTRIC: Paul A. Goodwin has been appointed manager of technical service in the marketing section of the silicone products department. His new assignment will be to direct technical service activities in the fields of silicone fluids, resins, emulsions and specialty products. He and his staff will be located at Waterford, New York.

DU PONT: James A. Fredrickson, manager of technical sales for the pigments department, has been appointed special assistant to the director of sales. . .**Dr. Willard F. Spengeman,** research supervisor of the pigment color sales service laboratory at Newark, N. J., succeeds Mr. Fredrickson. . .**Dr. Harold C. Brill,** technical sales representative at the Newport, Del., pigments plant, replaces Dr. Spengeman. . .**Karl E. Ackley** has been appointed manager, and **Frederick S. Baker** has been named production superintendent of the Atlanta finishes plant, now under construction at Tucker, Ga. **Robert E. Durfee,** assistant plant manager of the Fort Madison, Iowa, finishes plant, will succeed Mr. Ackley as plant manager at Everett.

HERCULES POWDER: Dr. Richard E. Chaddock has been appointed to the newly created post of director of development for the Virginia cellulose department. . .**Dr. William G. Kinsinger** was appointed manager of the sales research division, succeeding Dr. Chaddock. . .Four new positions for managerial sales personnel of the naval stores department were announced as follows: **L. E. Anderson,** sales manager, oxychemicals division . . .**Richard J. Both,** manager, Chicago district office. . .**P. J. Reno,** sales manager, agricultural chemicals division. . .**Allen C. Gunter,** manager, Dallas district office.

here's why
GRACE CRYSTAL UREA
is PREFERRED FOR PAINTS!
Quality paints and varnishes depend on quality ingredients. Among the more important of raw materials preferred for quality paint products today is Grace Crystal Urea.
Made with laboratory purity and control in Grace's new $20,000,000 Memphis plant, Grace Crystal Urea imparts new hardness, durability, and gloss to enamels and baking finishes used on motor cars, toys, furniture, appliances, and a host of other consumer and industrial products.
For urea you can depend on, insist on Grace Crystal Urea, the product backed with a world of experience.
RIGID SPECIFICATIONS of GRACE CRYSTAL UREA
pH (10% solution at 20° C.) 7.0 to 9.8
Water 0.50% Max.
Ash 35 p.p.m. Max.
Iron 2 p.p.m. Max.
Free Ammonia 40 p.p.m. Max.
Color, A.P.H.A. (10 g. in 100 ml. methanol) 10 Max.
Turbidity, A.P.H.A. (50 g. in 100 ml. Water) 30 p.p.m. Max.
Samples of Grace Crystal Urea are available for your testing or process. Simply address your request to Grace on your letterhead indicating if possible the application in which you are interested.
Grace chemical co.
memphis tennessee
W. R. GRACE & CO.
DIVISION OF W. R. GRACE & CO.

Give your light-color alkyds

Locked-in Color Stability

with

NEO-FAT® 132

Your alkyds retain their color stability when you lock it in with Armour's Neo-Fat 132. This high stability fatty acid gives outstanding color retention. From freight car finishes to hardware enamels, your light color alkyds stay light! They dry fast too, through and through—forming an extraordinarily hard film. And because Neo-Fat 132 never varies from published specifications, your alkyds will always have the *same* uniform color and high quality.

See for yourself how Armour Neo-Fat 132 can give your alkyd a competitive advantage. Send the coupon now for a sample and for further information.

ARMOUR CHEMICAL DIVISION

© Armour and Company • 1355 W. 31st St. • Chicago 9, Ill.

MAIL WITH YOUR LETTERHEAD TODAY!

Armour Chemical Division, 1355 W. 31st Street, Chicago 9, Illinois

Please send me:

Sample: ☐ Neo-Fat 132

Information: ☐ Formulations for Neo-Fat 132

☐ Other Armour High Quality Fatty Acids V4

Name_____

Title_____

Firm_____

Address_____

City_____ Zone_____ State_____

PATENTS

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired (to foreign countries $1.00 per copy) to the publisher.

Oil-Soluble Phenolic Resins

U. S. Patent 2,734,878. Sydney Robbins and Robert H. Runk, Pittsburgh, Pa., assignors to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania.

An air-drying varnish comprising as the essential resinous ingredients thereof the product derived by heat-bodying at a temperature of from 220°C. to 250°C. for a period of not in excess of an hour a mixture of (a) from 10 to 30 gallons of a glyceride of an unsaturated drying oil fatty acid having at least two ethylenically unsaturated groups and (b) 100 pounds of a phenolic resin derived by heating in the presence of substantial amounts of water comprising at least 10% of the weight of the reaction mixture a mixture of phenols composed of from 7 to 20 mol per cent of diphenylolpropane, and from 93 to 80 mol per cent of butyl phenol, and from 1.65 to 2.10 mols of formaldehyde per mol of the phenols, and from ½% to 3%, based on the weight of the phenols, of oxalic acid as a catalyst, the mixture of phenols, formaldehyde and oxalic acid being refluxed for at least 15 minutes until substantially all the phenols and formaldehyde have reacted together, then dehydrating the reaction mixture under vacuum to remove substantially all the water therefrom, the temperature of the reaction mixture during said dehydration not exceeding 80°C., restoring atmospheric pressure and heating the dehydrated resin to an elevated temperature of from 140°C. to 170°C. until the resinous reaction product has a ball and ring temperature of from 135°C. to 160°C., the mixture of (*a*) and (*b*) being heat-bodied until a 50% solution in xylene has a viscosity of from J to L on the Gardner-Holdt scale, films of the heat-bodied varnish air drying in the order of one hour at room temperature.

Wood Finishing Composition And Method Of Making

U. S. Patent 2,734,879. Frank H. Lyons, Memphis, Tenn., assignor to E. L. Bruce Company, Memphis, Tenn., a corporation of Delaware.

A penetrating seal finish having a resin comprising the reaction product of drying oil fatty acids in an amount from about 30 to 50% by weight of the resin, and containing not in excess of 16% saturated fatty acids and not in excess of 40% oleic acid, a pentaerythritol ester of rosin having an acid number of less than 20 and being in an amount from about 18 to 35% by weight of the resin, pentaerythritol in an amount from about 10 to 15% by weight of the resin, dilinoleic acid in an amount from about 5 to 15% by weight of the resin, a major portion of all said ingredients reacted to completion and further reacted to substantial completion with phthalic anhydride in an amount from about 11 to 20% by weight of the resin, said resin having an acid number within the range of about 20 to 85 and a solvent, the penetrating seal finish having a viscosity of about A1 to A3 Gardner scale.

Waterproofing Compositions And Their Use In Coatings

U. S. Patent 2,735,791. Pierre Pascal Peyrot and Jacques Proriol, Lyon, France, assignors to Societe des Usines Chimiques Rhone Poulenc, Paris, France, a French body corporate.

Organic fibrous material water-proofed by the presence thereon of 0.5 to 6% of its weight of a water-proofing composition comprising, calculated on the dry solid content, 20 to 60% by weight of a methyl polysiloxanic resin having a CH_3:Si ratio between 1.3:1 and 1.7:1, 25 to 50% by weight of a methyl polysiloxanic oil having a CH_3:Si ratio between 1.9:1 and 2.1:1 and from 8 to 40% by weight of triethanolamine titanate.

Now proven!
IMPERIAL DISPERSIONS EFFECTIVELY BANISH LATEX COLOR DIFFICULTIES

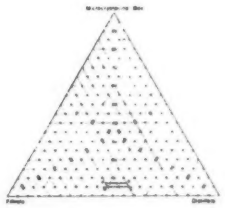
SIMPLIFIED LATEX AND EMULSION PAINT MANUFACTURING

A six year record of product uniformity and user satisfaction is part of the IMPerse story. Call on the Pigment Color Division of Imperial and see how IMPerse colors can help you. IMPerse colors, 20% aqueous organic pigment dispersions, mean virtual elimination of costly flocculation and color float. Learn how greater economy accompanies maximum uniformity and flexibility... deep tones and pastels are easily obtained from the same dispersion. IMPerse colors are available in a full range of decorator shades and in both anionic and non-ionic form. IMPerse colors are controlled by "micro" test for maximum dispersion and stability. IMPerse colors, a development of Imperial research, may well be an answer to some of your annoying latex and emulsion paint pigmentation problems.

For further information drop a line or call the
PIGMENT COLOR DIVISION • IMPERIAL PAPER & COLOR CORP., GLENS FALLS, N.Y.

Wax Composition

U. S. Patent 2,734,365. Seymour W. Ferris, Mount Holly, N. J., and John D. Tench, Prospect Park, and Irl N. Duling, Jr., Media, Pa., assignors to Sun Oil Company, Philadelphia, Pa., a corporation of New Jersey.



U. S. Patent 2,734,365

A new composition of matter comprising from 43 to 55 parts of a slack wax distillate boiling within the range of from about 360°F. to 500°F. at 2 mm. Hg pressure absolute and having a melting point of from about 110°F. to 120°F.; from 40 to 50 parts of a slack wax distillate fraction filtrate boiling within the range of from about 360°F. to 580°F. at 2 mm. Hg pressure absolute and having a pour point of from about 70°F. to 80°F. and a Saybolt Universal viscosity at 210°F. of about 42 to 48; and from 5 to 7 parts of a microcrystalline wax having a melting point of from about 140°F. to about 155°F. and having a Saybolt Universal viscosity at 210°F. of from about 70 to 90.

Varnish Remover

U. S. Patent 2,736,710. Herman R. Nack, Troy, and Leo J. Novak, Dayton, Ohio, assignors to Chadeloid Corporation, Dayton, Ohio, a corporation of Delaware.

A liquid composition for removing varnish and lacquer, said composition consisting of hydrolyzed dextran, isopropyl alcohol, and water, the hydrolyzed dextran constituting at least about 40% by weight of the composition, and water in the range of about 15 to 50% by weight of the composition, and isopropyl alcohol from about 3% to 15% by weight of the composition.

Luminescent Magnesium Oxide

U. S. Patent 2,736,712. William A. Runciman, Harrow Weald, England, assignor to General Electric Company, a corporation of New York.

A luminescent material consisting essentially of crystalline magnesium oxide containing in the crystal structure both activating chromium in a ratio of from .01% to 1% chromium atoms to magnesium atoms and at least one of the metals lithium, sodium, potassium and thallium in the monovalent form and in a ratio from 0.1% to 10% of atoms of said metal to magnesium atoms.

here's the most efficient mixer developed in years

✔ *reduces mixing time over 50%*

✔ *always produces a superior mix*

DAY TWIN MOTION PONY MIXER

In recent field tests this new Day Mixer produced a superior mix in only 15 minutes, as compared to 35 minutes, required by a Day Single Motion Mixer.

Here's why: twin spindles, with counter rotating, overlapping blades, operate at new higher speeds. Adjustable scraper blade at edge of rotating can, moves material into orbit of agitator blades, affecting counter current mixing and eliminating all "dead spots". This multiplicity of movements gives a homogeneity of mix that will meet your most exacting requirements. Product contamination is eliminated, as there are no stuffing boxes or bearings in product zone. All the rugged construction, meticulous engineering, that has made the Day Single Motion Mixer the leader, is built into this new Day Mixer. Working capacities of 3, 10, 25, 40, 50, 80, 100, 125 gal.

For complete information write for Bulletin I-502-PM.

in mixing equipment FOUNDED 1887 DAY *means longer life span*

THE J. H. DAY COMPANY

4932 BEECH ST., NORWOOD, CINCINNATI 12, OHIO
Division of Cleveland Automatic Machine Company

Quality equipment for baking, paint and varnish, printing ink, chemical, rubber, pharmaceutical, cosmetics, paper and pulp, explosives, food, ceramics, candy, soap, sugar and milk products.

Eastern Canada: Brantford Oven & Rack Co., Ltd., Brantford, Ontario
Western Canada: British Canadian Importers, Vancouver, British Columbia
Mexico: T. de la Pena e Hijos, S.A., Nazas 45-A, Mexico 5—D.F.

Stabilized Chlorine Containing Resins

U. S. Patent 2,734,881. Robert E. Lally, Bedford, and Raymond J. O'Hara, Maple Heights, Ohio, assignors to Ferro Corporation, Cleveland, Ohio, a corporation of Ohio.

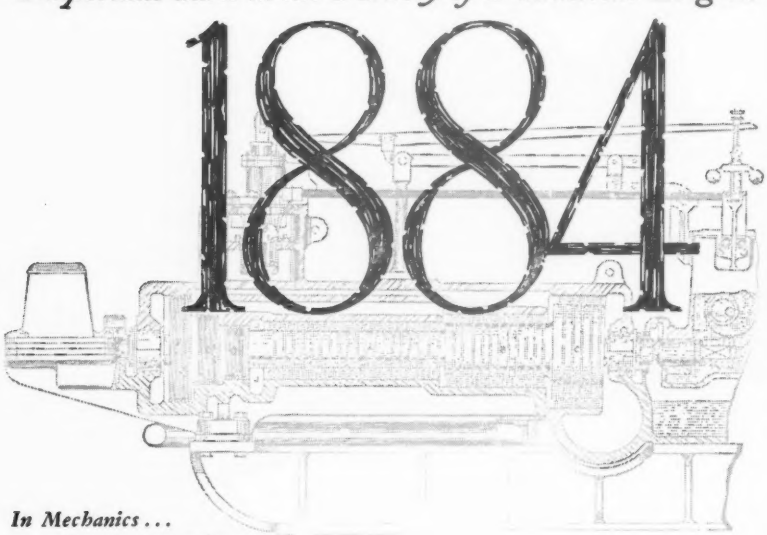
A composition of matter comprising a chlorine containing vinyl resin and from about 0.5% to about 8.0% by weight, based on said resin, of a stabilizer, said stabilizer comprising an admixture of from about 1 to about 5 parts of an epoxy compound having a boiling point not less than 212°F. and from about 1 to about 5 parts of a compound selected from the class consisting of aliphatic polyhydric alcohols having at least two and not more than nine hydroxyl groups and a boiling point not less than 250°F., esters of aliphatic polyhydric alcohols said esters having at least two and not more than nine hydroxyl groups and a boiling point not less than 250°F., and ethers of aliphatic polyhydric alcohols said ethers having at least two and not more than nine hydroxyl groups and a boiling point not less than 250°F.

Vinyl-Alkyd Castor Oil Copolymer

U. S. Patent 2,734,880. Heinz Ehring, Krefeld, and Karl Raichle, Krefeld-Uerdingen, Germany, assignors to Farbenfabriken Bayer Aktiengesellschaft, Leverkusen, Germany, a corporation of Germany.

The process which comprises interpolymerising a monomeric aromatic mono vinyl hydrocarbon with a mixture of alkyd resin comprising the acid radical of an unsaturated fatty acid with isolated double bonds, in the presence of an inert solvent.

Important dates in the History of Industrial Progress



In Mechanics ...

Parson's steam turbine, seen here in a longitudinal diagram, was the first step toward the huge turbines that supply motive power to generators in today's power plants.

In the history of fats and waxes

GROCO 281 DISTILLED SOYA BEAN FATTY ACIDS

Special Alkyd Grade

Titre	23° – 27° C.
Color 5¼" Lovibond Red	3 max.
Color 5¼" Lovibond Yellow	20 max.
Color Gardner 1933	4 max.
Color Gardner 1933—after S. & W. Heat Test	7 max.
Unsaponifiable	1.5% max.
Saponification Value	198 – 202
Acid Value	197 – 201
Iodine Value (WIJS)	135 – 145

Hübl proposed a method for determining the amount of unsaturation of fatty acids by measuring their iodine absorption. The WIJS method in general use today for determining iodine value is a modification of Hübl's procedure. It is widely used to determine the suitability of a fatty acid for a given application.

For alkyd resin manufacturers, the exceptionally high iodine value for GROCO 281 SOYA BEAN FATTY ACIDS means a high degree of unsaturation, hence greater production economy. In addition, GROCO 281 meets the most critical specifications for minimum color and chemical change under heat.

Send for samples and catalog "Fatty Acids in Modern Industry."

A. GROSS & COMPANY

295 Madison Avenue, New York 17, N. Y.
Factory: Newark, N. J. Distributors in Principal Cities
Manufacturers Since 1837

Metallic Paint

U. S. Patent 2,731,436. Robert J. Stetz, Westlake, and Edmund Rogers, South Euclid, Ohio, assignors to The Engine Parts Manufacturing Co., Cleveland, Ohio, a corporation of Ohio.

A bronzing lacquer comprising a finely divided metallic pigment, a polyalkyl acrylate lacquer base in a solvent for said lacquer base, and an amount by volume approximately equal to the foregoing ingredients of fluorochloromethane.

Fire-Resistant Protective Coating

U. S. Patent 2,734,827. Robert M. Hooks, Fort Worth, Tex., assignor to Southwestern Petroleum Co., Inc., Fort Worth, Tex., a corporation of Texas.

A fire-resistant, waterproof and weatherproof coating material comprising in major portion substantially equal parts by weight of any asphalt having a melting point of from 160°F. to 180°F. and a volatile asphalt solvent, and including in minor portion 3% to 5% by weight of powder-like, finely divided particles of silica aerogel uniformly dispersed in said asphalt and solvent and 5% to 15% by weight of a fire-retardant chemical.

Cellulosic Coating Compound

U. S. Patent 2,736,664. Theodore F. Bradley and Roy W. H. Tess, Orinda, Calif., assignors to Shell Development Company, San Francisco, Calif., a corporation of Delaware.

A coating composition containing a cellulose derivative of the group consisting of cellulose nitrate, cellulose acetate, cellulose propionate, cellulose stearate, cellulose valerate, ethyl cellulose, methyl cellulose, butyl cellulose, benzyl cellulose, glycol cellulose, cellulose acetostearate, and cellulose acetotartarate and a completely esterified mixed ester of a polyhydric alcohol made up only of the elements carbon, hydrogen and oxygen and containing from 3 to 12 hydroxyl groups having at least one of the hydroxyl groups esterified with a tert-alkyl substituted benzoic acid wherein the tert-alkyl radical contains from 4 to 16 carbon atoms, and having the remaining hydroxyl groups esterified with a rosin acid.

Modified Styrene Compositions

U. S. Patent 2,736,715. Henry Brunner, Langley, England, assignor to Imperial Chemical Industries Limited, a corporation of Great Britain.

A process for producing a drying oil-soluble styrene interpolymer which comprises polymerizing, in the presence of a Friedel-Crafts catalyst, a mixture of styrene and a polyhydric alcohol ester of a resin acid, the proportion of styrene in the polymerized mixture being from 75% to 99% by weight.

Method of Stabilizing Sprayable Paints

U. S. Patent 2,736,665. Edmund Rogers, South Euclid, Ohio, assignor to The Engine Parts Manufacturing Company, Cleveland, Ohio, a corporation of Ohio.

A method for stabilizing pigmented lacquer compositions in which the pigment ordinarily has a tendency to agglomerate or settle to irreversible masses, which comprises adding to said lacquer an approximately equal volume of a fluoro-chloromethane.

Melamine Purification

U. S. Patent 2,734,059. Richard W. Hamilton, Darien, and William C. Mallison, Noroton, Conn., assignors to American Cyanamid Company, New York, N. Y., a corporation of Maine.

The method for purifying crude melamine which comprises: forming a slurry of crude melamine in an aqueous saturated melamine solution, said slurry containing crude melamine in the range of from about 1% to about 15% solids, subjecting said slurry to a cyclone classification operation, separately collecting overflow fines containing essentially purified melamine and underflow coarse containing essentially impurities from said classification, subjecting said resultant overflow fines to an alkaline wash, air-drying and recovering pure melamine.

Dextran Coating Composition

U. S. Patent 2,734,828. Harry A. Toulmin, Jr., Dayton, Ohio, assignor to The Commonwealth Engineering Company of Ohio, Dayton, Ohio, a corporation of Ohio.

As a new article of manufacture for use in a lacquer and the like, a composition comprising a blend of 50% to 95% of a benzyl ether of a dextran and 5% to 50% of an ester of a dextran with a saturated fatty acid containing from 8 to 18 carbon atoms, the ester containing, per anhydroglucopyranosidic unit, from less than 1.0 to 3.0 radicals derived from the fatty acid.

Lead Drier Concentrate

U. S. Patent 2,734,829. Funston G. Lum, Richmond, Calif., assignor to California Research Corporation, San Francisco, Calif., a corporation of Delaware.

A paint and varnish drier concentrate comprising a solution in a petroleum thinner of the reaction product of an organic, acid-soluble lead compound with a mixture of toluic and naphthenic acids, the lead metal content of said solution being in the range from about 15% to about 35% by weight, and the calculated lead content of the solution attributable to the introduction of lead toluate being from about 3% to about 17.5% by weight, based on the weight of the solution.

Luminescent Silicates

U. S. Patent 2,736,711. Pamela Elfrida Gooding, Ruislip, and Alfred Hamilton McKeag, North Wembley, England.

A luminescent silicate of the oxides of lithium and at least one of the metals barium and strontium in which the molar ratio of $BaO+SrO+Li_2O:SiO_2$ is between 3:1 and 1:1, the molar ratio of $BaO+SrO:Li_2O$ is between 5:1 and 1:5, and the molar ratio of BaO:SrO is from 0:2 to 2:0, activated by about 1-20% by weight of trivalent cerium and 0 to about 5% by weight manganese.

Modified Alkyd Resins

U. S. Patent 2,734,876. Theodore F. Bradley, Orinda, Calif., assignor to Shell Development Company, San Francisco, Calif., a corporation of Delaware.

A modified resin comprising the resinous reaction product of a mixture comprising phthalic acid anhydride, glycerol and as a modifying agent 5% to 90% by weight of said resin of p-tertiary butylbenzoic acid.

LANCASTER, ALLWINE & ROMMEL
REGISTERED PATENT ATTORNEYS

•

Suite 424, 815 — 15th St., N. W.
Washington 5, D. C.
Patent Practice before U. S. Patent Office. Validity and Infringements Investigations and Opinions.
Booklet and form "Evidence of Conception" forwarded upon request.

Our Technical Service Laboratory Will Help You Build Better Products With Neville Resins

If you are not already using Neville coumarone-indene or petroleum resins in your paint or varnish formulae, it will pay you to request the assistance of our Technical Service Laboratory. Our chemists will work with yours to establish the exact grade to best suit your purpose. Neville resins are inert, add resistance to acids, alkalis, brine and water and may be cold-blended or cooked with all commonly used drying oils. Use the coupon to write for details.

Resins—Coumarone-Indene, Heat Reactive, Phenol Modified Coumarone-Indene, Petroleum, Alkylated Phenol • **Oils**—Shingle Stain, Neutral, Plasticizing, Rubber Reclaiming • **Solvents**—2-50 W Hi-Flash, Wire Enamel Thinners.

Neville Chemical Company
Pittsburgh 25, Pa.

NEVILLE

Please send information on Neville Chemicals.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

NEWS

Houston Club Again Sponsoring Paint Course

For the third year, in an attempt to keep abreast of the times and ahead of the manpower situation, the Houston Paint & Varnish Production Club is sponsoring a paint technology course at the University of Houston. John A. Garrett, of the Pittsburgh Plate Glass Co., is instructor.

The main purposes of the course, as outlined by the Houston educational committee headed by Clarence A. Wells, are: to attract chemists and chemical engineers now in school to the coating industry, and to provide means for industry to give new employees rapid training in paint technology in lieu of two years practical experience.

C. A. Wells

J. A. Garrett

The course consists of two semesters per year. The first semester involves a study of physical and chemical properties of raw materials and their characteristics in coatings. The second semester deals with various types of coatings, their properties and applications. Although credit is given for this course in the amount of four semester hours toward a bachelor's or master's degree, allied industries who work with protective coatings keep the class well attended with auditors.

•

Clean Up, Paint Up, Fix Up Dates Set For N. Y. C.

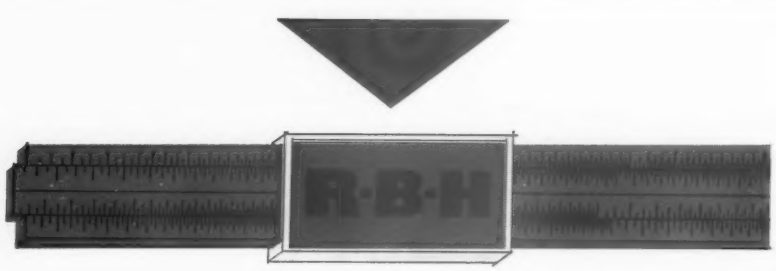
The dates of April 29th to May 12th have been set as "Clean Up, Paint Up, Fix Up" weeks in the greater Metropolitan New York area.

Very shortly these dates will be publicized to the mayors of all towns and cities in the greater New York area. This announcement will include a special plea from the Hon. Joseph P. Vaccarrella, Mayor of the City of Mount Vernon (N.Y.) urging all suburban mayors to join with him in promoting a grand "Clean Up, Paint Up, Fix Up" program.

In connection with this promotion, two films are available on a no charge basis. They are:

"Man of Action," a 16 mm. sound film in full color animated. Running time is 13½ minutes. Film is completely non-commercial and stresses the need for painting and maintenance to avoid rundown homes and eventual slums. Available from Associated Films Inc., Broad and Elm Streets, Ridgefield, N.J.

"The House in the Middle," a 16 mm. film in full color and sound. Running time 12½ minutes. Film is a vivid lesson on the importance of keeping homes in good repair. Describes the threat to the lives and property of everyone in the community from homes of untidy yards, houses of dried, weathered lumber, unprotected by paint. Available from National Clean Up, Paint Up, Fix Up Bureau, 1500 Rhode Island Ave., Washington 5, D.C.



...for known manufacturing costs

Guesswork in establishing manufacturing costs is at a minimum when your formulations are based on R-B-H pigment dispersions.

With R-B-H you reduce waste . . . you can swing into production of a gallon or fifty drums with the least disruption of plant schedules, with less overtime, without capital investment.

R-B-H . . . *for finishes of integrity*

R-B-H Dispersions

DIVISION OF INTERCHEMICAL CORPORATION
DISPERSION TECHNICIANS
BOUND BROOK, NEW JERSEY

Pigment dispersions in nitrocellulose; ethyl cellulose; urea formaldehyde; vinyl and alkyd resins; chlorinated rubber and other plastic binders.

R-B-H IS A TRADE-MARK OF INTERCHEMICAL CORPORATION

NEWS

Construction Industry Starts Year Strongly

New contract award information covering the first two months of 1956 indicates that the construction industry got off to a much better start this year than most analysts expected, Dr. George Cline Smith, vice president and economist of the F. W. Dodge Corp., recently told an audience of the Boston Chapter of the Producers' Council, Inc.

Dr. Smith said the most striking feature of the current upsurge in construction is the strength of industrial, utility and public works contracts. But he also called attention to an upturn in residential contracts, "which because of its generally unexpected nature, is probably the most significant aspect.

"Almost everyone," Dr. Smith said, "expected the housing downturn which began late in 1955 to continue for several more months at least. But residential contract awards in the first two months of this year, as compiled from Dodge Reports in the 37 eastern states, actually ran six per cent ahead of the same period last year. The total of $1.5 billion of residential awards was a new record for any January-February period.

"Non-residential building contracts for the two months ran 17 per cent ahead of the same period last year. However, there were some widely divergent trends within the category. Sharpest increase was recorded in contracts for industrial buildings, up 66 per cent above last year. Contracts for schools overcame the relative lethargy which prevailed last year, and rose by 26 per cent. And commercial building contracts continued their long-term rise by going up another 15 per cent. All other classes of non-residential building fell below last year's levels, but these classes together make up a relatively small part of the total.

"In the heavy engineering category, public works contracts were 64 per cent ahead of last year, and public utility contracts rose by a phenomenal 84 per cent.

"One theme that runs through the figures is the strength of business investment, which shows up in the industrial, commercial and utility figures. This, it seems to me, indicates a high degree of confidence that today's record levels of production and sales are not a peak, but merely a step toward higher levels ahead," Dr. Smith asserted.

•

New M. W. Kellogg Offices

The M. W. Kellogg Co. will be located after Apr. 29 at 711 Third Ave., New York City. Main offices for many years have been at 225 Broadway, but growth in recent years has forced the company to several other locations in that area for office space.

Pullman Inc., Kellogg's parent company, will also have offices in the building, as will Trailmobile Inc., another Pullman subsidiary.

•

Thixotropic Vehicles

The Houston and Dallas Paint and Varnish clubs recently heard Nick G. Contos, technical director of the T. F. Washburn Co., Chicago, discuss thixotropic vehicles and their applications. Specific applications of the vehicles and the vast improvement over former thixotropic additives were highlighted in his talks to both clubs.

Why this Hockmeyer Horizontal Paste Mixer brings you

3 IMPORTANT ADVANTAGES

1. Faster mixing
2. Greater efficiency
3. Easier cleaning

The Hockmeyer Horizontal Paste Mixer's 3 sets of mixing blades are specially designed, precision built. They eliminate "dead spots" and material build-up on tank sides. Their double rolling action agitates the batch into a homogenous mass in the shortest possible time. The unit is excellent for lead pastes, wood fillers, caulking compounds, color dispersions and other heavy, non-flowing materials. Its greater mixing efficiency provides a bonus in the form of lower horsepower requirements.

One of the Hockmeyer Horizontal Paste Mixer's most important advantages is that it is self-unloading. Its unusual mixing action pushes out even viscous, non-flowing materials; the bottom center gate outlet controls the rate of flow.

Cleaning this mixer is easy. Just place a solvent in the machine and start the motor.

The Hockmeyer Horizontal Paste Mixer is *safe* to use, too. All external moving parts are covered with a steel guard. A removable steel grating over the top opening prevents anything falling in and being caught in the blades.

The Hockmeyer Horizontal Paste Mixer is a valuable unit on both continuous and changing batch operations. Write today for free technical data sheet.

3 sets of blades touch every area of tank during mixing action!

HERMAN HOCKMEYER & CO.
341 COSTER ST., NEW YORK 59, N. Y.

Herman Hockmeyer and Company PVP-46
341 Coster St., New York 59, N. Y.

GENTLEMEN: Please send me your free, illustrated technical data sheet describing the Hockmeyer Horizontal Paste Mixer

My name_____
Company_____
Address_____
City_____ Zone____ State____

NEWS

Hanna Paint Starts New Plant In Middle East

Completion of a new paint manufacturing plant in Lebanon, has been announced by the Hanna Paint Manufacturing Co., Columbus, Ohio, through its subsidiary, James B. Sipe and Company, Pittsburgh, Pa.

Located on a nine acre tract overlooking the Mediterranean Sea just south of Beirut, the new plant affords over 10,000 sq. ft. of operational floor space for paint manufacturing, warehousing and technical facilities. It is operated and staffed under the provisions of the sole charter granted by the Lebanese Government for paint manufacturing facilities in Lebanon. Production began last month.

The new plant will be chartered as Sipes International Paint Manufacturing Co. and will operate on a separate corporate basis. Sipes International will manufacture and market paint products under the same formulations and trade-names used by James B. Sipe and Company in Pittsburgh. Present plans call for the new plant to serve the market in Lebanon, Saudi Arabia, Iran, Jordan, Syria, Iraq, Egypt and Turkey.

At the same time, it was announced that Ralph P. Elmer, Columbus, Ohio, has been appointed general manager of Sipes International. Mr. Elmer has been associated with the Hanna Paint Manufacturing Co. for 36 years and most recently held the position of vice president in charge of production of the Hanna Industrial Finishes Co., Columbus, Ohio.

•

Venezuela Finishes Plant Planned By Du Pont

Plans for a paint plant in Venezuela, to produce finishes for the Venezuelan market, have been announced by the Du Pont Co.

The finishes will be manufactured and sold by the company's recently formed Venezuelan subsidiary, Du Pont de Venezuela, C.A., whose sales and administrative offices are now located in Caracas.

Construction of the plant in the rapidly developing industrial section of Valencia, about 100 miles west of Caracas, is scheduled to begin in the near future. Its products will include lacquers, enamels, paints, varnishes, resins, and thinners for the automotive, automotive refinish, industrial, household and maintenance fields.

•

Dow Plans $20 Million Plant

Plans for a new $20,000,000 manufacturing operation, to be located in the Baton Rouge area of Louisiana, were recently announced by The Dow Chemical Co.

Dow President Dr. Leland I. Doan disclosed the company has taken options on three tracts of land on the west bank of the Mississippi with the expectation of building facilities to produce chlorine, caustic soda and several organic chemicals.

•

Correction

A news story last month carrying the pictures of Sidney B. Levinson, technical director, and Morris Coffino, chief chemist of the D. H. Litter Co., had the identifying captions transposed. While we may inadvertently have complimented both gentlemen, we hasten to correct the error.

NEW LAWS REQUIRE
THE USE OF
NON-TOXIC COLORS
FREE FROM LEAD
FOR CERTAIN USES

We have available *clean, bright, fade-resistant* solid colors and pastel shades and tints that are stable in the package. For interior or exterior use in oil or varnish type vehicles. Soft in texture, easy wetting and grinding, high tint power and non-flocculating.

Order a trial quantity of these ATLAS PIGMENTS now.

CHECK OUR
A8069 Hansa Yellow Toner "G"
and
A8716 Hansa (Type) Orange Toner
for
Economy • Safety Durability

H. KOHNSTAMM & CO. INC. HK STRENGTH · UNIFORMITY · PURITY

ESTABLISHED 1851
KOHNSTAMM & CO., Inc.
89 PARK PLACE, NEW YORK 7 • 11-13 E. ILLINOIS ST., CHICAGO 11
2632 E. 54 ST., HUNTINGTON PK., CALIF.

Southwestern Paint Meeting, May 10-12, To Hear Dr. J. S. "Shorty" Long; 500 Expected to Attend

Dr. J. S. "Shorty" Long, research consultant at Devoe and Raynolds, Inc., will be the featured speaker at this year's Southwestern Paint Convention. The meeting will be held May 10 to 12 at the Statler Hilton Hotel, Dallas, Texas.

According to the Dallas Paint and Varnish Production Club, acting as host committee, an attendance of between 450 and 500 members and guests is anticipated.

In addition to Dr. Long, a group of distinguished speakers has been invited to present a variety of production and technical papers to the convention.

J. S. Long

A. C. Elm

C. L. Smith

M. A. Glaser

C. H. Flynn

O. A. Garlick

J. A. Langer

J. H. Musch

Dr. Long was for many years chemical director of Devoe and Raynolds. In order to have the time necessary for research work on a high plane, he retired from the job last year. However, he remains actively connected with the company as a consultant. He is presently supervising four graduate students at the University of Louisville in work toward the Ph. D. degree.

The list of honors accorded Dr. Long is legion. Some of the best known of these are: 1954 Mattiello Lecturer; elected as one of the ten outstanding scientists in the paint, varnish and plastics field by the American Chemical Society in 1947; presented George B. Heckle Award in 1953.

The convention will also hear reports from Clyde L. Smith, president; Milton A. Glaser, president elect; C. Homer Flynn, executive secretary of the Federation of Paint and Varnish Production Clubs, and R. W. Blair, vice president of the Southwestern Zone of the National Paint, Varnish and Lacquer Association.

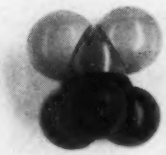
Following are program highlights: Thursday, May 10 will be reserved for informal entertainment and for the renewing of old acquaintances. There will be no formal activities on this day.

Friday, May 11—registration; golf tournament; Raw Materials and Equipment Exhibition; cocktail hour; buffet dinner.

Saturday, May 12—Houston Paint and Varnish Production Club Technical Committee Paper; Dallas Technical Committee; "The Story of Flush Colors," Joseph A. Langer, The Hilton Davis Chemical Co.; "At Long Last," Dr. J. S. Long; "Principles of Paint Testing," Dr. A. C. Elm, The New Jersey Zinc Co.; "Ball Milling," Oakley A. Garlick, Paul O. Abbe, Inc.; "The Evaluation of Synthetic Latices in Aqueous Exterior Paints," John H. Musch, The Firestone Tire and Rubber Co.

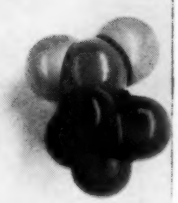
The Nitroparaffins

Industry's Newest Chemical Building Blocks



nitromethane CH_3NO_2

nitroethane $CH_3CH_2NO_2$



1-nitropropane $CH_3CH_2CH_2NO_2$

2-nitropropane $CH_3CHNO_2CH_3$

Learn how the NP's may be of help in improving your present product or in creating new products.

write:

COMMERCIAL SOLVENTS CORP.
260 MADISON AVE.
NEW YORK 16, N. Y.

CSC

Branches in principal cities

abstracts

Abstracts of Papers which were read at the Annual 1955 meeting of the Paint and Finishes Section of the German Chemical Society at Stuttgart. Important points raised in the verbal discussions to these papers are incorporated.

Transition from Order to Disorder In Crystalline Inorganic Solid Bodies

By F. Hund.

The author dealt with the causes of color phenomena with solid bodies and explained color changes as changes of the energy levels. Thus, can be explained the influence of particle sizes on the color, with which the author demonstrated the moving of the extinction coefficient of silver colloidal dispersions with the particle size.

There was also demonstrated the simultaneous changes of other characteristics, of the electrical and magnetic properties and, finally, the influence of the various types of order arrangement defects was considered. The individual examples for the changes conditioned by subtraction, addition, substitution or division allow for possibilities to be perceived which the pigment industry will utilize to an increasing extent in order to modify its products to particular specified requirements.

Also discussed was the color change of cadmium sulfide by traces of foreign matters (– 1%) as a further example for such desired changes in characteristics.

Regarding the significance of "physical structural defects," it was shown how with the two defective structural arrangements, chemical and physical characteristics change—among these in particular, being color.

It is a characteristic feature that even extremely small amounts of foreign metals suffice to initiate quite considerable property changes in the substance. Such trace portions are in general, not capable of analytical detection. As an example, there can be cited the presence of gallium and indium in silicon dioxide, by which pigments of a reddish tone are obtained. The color tone of titanium dioxide can also be changed in a similar manner.

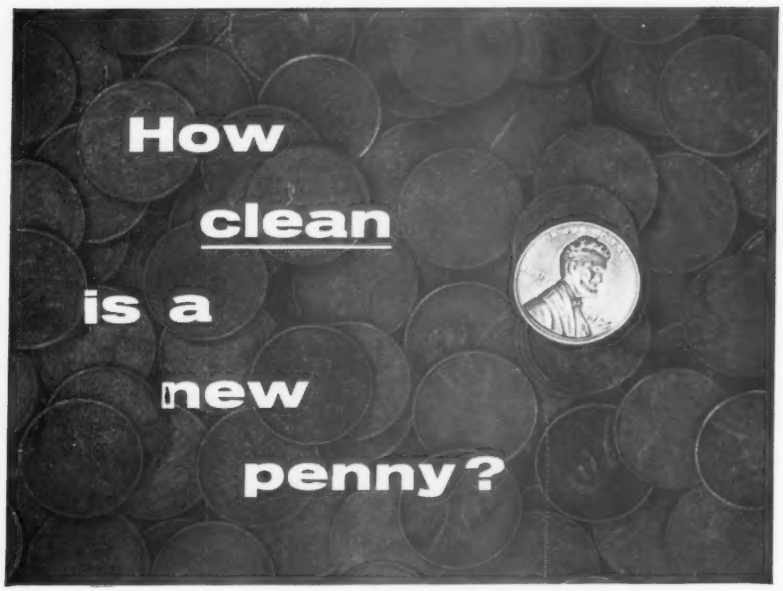
X-Ray Examination and the Structure of Pigments

By R. Koenig.

The author gave some indications and details of the test methods applied and then dealt with the results of X-ray examination applied to inorganic pigments. Thus, X-ray examination had shown that many materials which had formerly been regarded as amorphous, possess a crystalline structure and are mostly oriented in one direction. The powder tests showed Mars Yellow and hydrated chrome oxide green as amorphous; lampblack occupied a transition place being amorphous-crystalline, and the majority of pigments show a definite crystalline structure.

By means of his Debye-Scherrer diagrams the author was able to show that similarly constructed substances showed similar interference diagrams and that also from the interference lines, conclusions on the crystal structure were possible. Particularly objective in this connection were comparisons such as Rutile-Anatase or the individual oxidation stages of lead—Pb—PbO—Pb_3O_4—PbO_2.

Further, tests could be conducted during the heat treatment of cadmium selenide (up to 900° C.) and the crystal



Perhaps it was clean by old standards, but with today's knowledge of contaminants, the statement is jest. Today complete purity—*dependably* uncontaminated—could be more accurately stated *"clean as a Metasap® Stearate"*...a fact makers of fine paints are learning with profit!

For we started from the ground up...with a new modern plant, and set standards aimed to guarantee that Metasap Stearates shall be not only clean—*but cleaner than any other stearates you can buy!* Metasap uses the most complete and thorough series of fine screens, magnetic traps and filters to be found in the industry. (We even carefully filter the air.)

For stearates and other chemicals of supreme purity, uniformity and quality, come to Metasap for *all* your needs. Our technical service men will gladly advise you.

METASAP CHEMICAL COMPANY
HARRISON, NEW JERSEY • Chicago, Ill. • Boston, Mass.
Cedartown, Ga. • Richmond, Calif.
the cleanest stearates made

A NOPCO Subsidiary

transformations could be established. The author indicated further the possibility of establishing lattice disturbances by X-ray means and discussed the creation of a mineral pigment color chart by which each pigment would be characterized by its three strongest interference lines.

A number of interesting points were raised in the discussion to this paper. It was pointed out that X-ray examination methods possessed a great significance both for research and also for operational control in the field of pigment technology. The question arose about the limits within which such mixtures as Anatase and Rutile titanium dioxide could be identified; it was stated that in general, the limits of error lie at 1—2%. With still smaller amounts, the tube counter method would then be applied; this would presumably be utilized in order to establish the origin of lead white types.

It was pointed out that the X-ray method fell down when impurities were embodied in the crystal lattice of the pigment particles. It has only recently become known that the lattice disturbances are dominantly responsible for the activity, for changes of the color tone, etc. A large part of the further technical progress with inorganic pigments should accordingly be based on the fact of being able to control the lattice disturbances with certain knowledge.

The further question arose as to what possibility exists with the aid of the X-ray examination methods described, of obtaining more detailed knowledge on the secondary structure of the pigments. It was then stated that on the basis of the X-ray diagram one was not able to simply read off the characteristics of the pigments. Naturally, the structure could be ascertained and, in connection with this, conclusions on the secondary structure could be drawn. A query as to whether it was possible to identify various types of white lead from the diagram was confirmed. This is naturally not possible with the aid of photographic prints. It is possible by means of intensity curves. Lattice disturbances could be controlled by way of X-ray prints giving the desired characteristics to the product.

Determination of Pigment Surfaces By the Permeability Method

By H. Muck.

There are only a few characteristics for the classification of pigments. An important characteristic is the surface dimension. It would appear desirable to possess a method which would allow for the determination in a simple manner of the dimension of the pigment surface.

Various methods are available for the determination of the surface. The most accurate is the gas adsorption method which is not suitable for series investigations. The dyestuff absorption test is too specific to come into consideration forthe comparison of various pigments. A simple test procedure is represented by the permeability method. How far this method is applicable to the pigment field was investigated.

The theoretical fundamentals of the method, as well as the measuring apparatus developed by Blaine, Lea, Nurse and Pechukas, and improved by Carman, were described.

The conduction of the measurement with the apparatus of Blaine, Lea and Nurse, the sources of error, principally the dependency on the porosity of the pigments and the accuracy of the method were outlined in further discussion.

The employability of the method for operational control with the Lea and Nurse apparatus was tested on various types of titanium dioxide, zinc white, red lead and chrome yellow. It was pointed out that the method becomes uncertain with particle sizes below O. I. micron and that with porous particles one can only reckon on the ascertainment of the external surface. With such pigments, the gas absorption test method would render higher values, because the internal surface is comprised with this.

In the subsequent discussion to this paper, some of the disadvantages of the test method were discussed. It was considered, however, that this method does permit the paint industry to make certain advances in investigation and pigment control methods, by which, for example, in a practical manner, the surface of red lead can be ascertained. This method may be regarded as more

ARGO®

Methyl Glucoside

Ready to Roll

Today, this unique chemical is available in carload quantities. It is the only cyclic polyol offered on a commercial scale.

Its cyclic structure includes four esterifiable hydroxyl groups, making METHYL GLUCOSIDE an excellent and versatile raw material in the manufacture of

- reconstituted and upgraded drying oils
- tall oil esters and varnishes
- fatty acid esters
- plasticizers
- nonionic surface-active agents
- resin-modifiers

METHYL GLUCOSIDE is easy to handle, non-hygroscopic and free-flowing. That's further reason to try this low-cost polyol in your formulations.

For more information, write to the Chemical Division, CORN PRODUCTS REFINING COMPANY, 17 Battery Place, New York 4, N. Y.

elegant than the measurements which have been applied up to now with the aid of the dyestuff absorption test. It was mentioned that the value Q, which is the flow velocity, holds good theoretically for spherical shaped bodies; however, investigations by Carman have shown that the equations can always be applied. The methods described in the paper give good results. The question arose regarding the significance of compression to the test results and it was stated that the same results are always found, independent of this.

Another question was asked about the constancy of the method with relation to the particle size. The method must fall down if highly active pigments are measured. The limits in this connection would be obviously reached as the particles will be completely agglomerated. The author stated that the method becomes uncertain below a particle size of O.I micron. The possibility was also discussed of applying vibration to the particles. Lea and Nurse found that deviating results were obtained with a vibration apparatus and proposed preparing the powder wads without vibration.

It was finally stated that this method should be regarded only as a relative one which provides relative data. It is of value, however, because this data renders possible a better characterization of the pigments than the methods used hitherto, for example, the oil absorption number. At the Stuttgart Pigment and Paint Research Institute where this work was conducted, they had not been able to arrive at an absolute method, only a process which would aid practice with relative values for the characterization of pigments.

New Organic Pigment Dyestuffs: Their Preparation and Application

By M. Schmid.

Details were given of a new group of azo pigments which contain one or more times of what are termed the arylide groups; as is known these groups are characterized by the linkage —NHCO—. These new azo pigments are characterized further by their relatively high molecular weight.

Simple pigments, of the naphthol series for example, are known under the name "Permanent" and are prepared in the usual way by coupling of a diazo compound with a coupling component, for example, arylide of the 2,3 oxynaphthoic acid, by which also, for example, the naphthol AS is to be considered.

If it is desired to proceed to higher molecular azo pigments which are insoluble in organic solvents, plasticizers, etc., and by which the insolubility is not achieved by lackering, then the means which stand available by virtue of an azo coupling do not suffice to achieve uniform pigments in substance with the desired characteristics.

A departure is made from the usual series—arylide formation-coupling—with the preparation of the "Cromophtale," as these new pigments are termed (Protected trade name of the Ciba Aktiengesellschaft). The coupling is applied in advance, i.e. in the first phase there is achieved the production of the azo dyestuff carbonic acid by coupling in an aqueous medium, and, in a second phase, the acid chloride formation and condensation respectively in organic solvents with bases—as a rule, multinucleus diamines.

These new pigments are characterized by their practical insolubility in organic solvents in which active groups are lacking by their non-toxicity, temperature stability, favorable electrical characteristics, good light fastness and tone richness of the range which would lead to expectations of a wide field of application of these pigments in the plastics and lacquer industries.

It was emphasized in the discussion that this new class of dyestuff pigments serves to close an appreciable gap which has existed in the organic pigment range. Up to now, there has been no organic pigment which has been satisfactory as regards insolubility and which has served to meet requirements in this direction. If, as has been stated the new Cromophtale pigments are satisfactory in this respect, then a good future is ahead for them.

Lease the Exclusive TROY ANGULAR MIXER Now and Stop Stirring—Start Mixing

PROCESS MACHINERY DIVISION REPRESENTATIVES

BOSTON, MASS.
R. T. Forbes Co.
BUFFALO, NEW YORK
Commercial Chemicals, Inc.
CHICAGO, ILL.
C. M. Baldwin
CINCINNATI, OHIO
Palmer Supplies Co.
CLEVELAND, OHIO
P. S. Equipment Co.
DALLAS, TEXAS
Roy A. Ribelin Distributing Co.
DETROIT, MICHIGAN
J. W. Stark Co.
DENVER, COLORADO
L. H. Herr Co.
HOUSTON, TEXAS
Roy A. Ribelin Distributing Co.
LOS ANGELES, CALIF.
L. H. Butcher Co.
MEMPHIS, TENN.
Robert F. Sheahan Co.
NEW ORLEANS, LA.
Breffeilh & Sheahan
NEW YORK CITY
Phone: Troy, Pa. 32
ORLANDO, FLORIDA
Palmer Supplies Co. of Florida
PHILADELPHIA, PENNA.
T. J. Rudolph
PHILADELPHIA, PENNA.
(D. C., Va., Md., Del.)
W. J. Grant Co.
PITTSBURGH, PENNA.
Nelson Engineering Sales Co.
PORTLAND, OREGON
L. H. Butcher Co.
ROCHESTER, N. Y.
Commercial Chemicals, Inc.
SALT LAKE CITY, UTAH
L. H. Butcher Co.
SAN FRANCISCO, CALIF.
L. H. Butcher Co.
SEATTLE, WASHINGTON
L. H. Butcher Co.

TROY ENGINE & MACHINE CO.
Troy, Pennsylvania Telephone: Troy 32

The question was raised as to whether during the production process, any by-products are formed, which are soluble and which could act in a quality-reducing manner. It was stated that during the manufacturing process, all soluble products are dissolved out. Considerable care is taken to ensure this, so that one can be reasonably certain that no soluble products remain in the end product. It has been shown in practice that the requirements regarding low solubility are fulfilled. Thus for example, no solubility is established even in boiling benzene. Corresponding to this, no bleeding occurs either. Regarding the question of blue and green tones, it was stated that in this range, outstanding phthalocyanine types are available and thus here, there is no lack.

Summarized characteristics are given as follows: The pigments are very pure and have very good light stability. The covering power is outstanding. This corresponds to about 4 to 5 times the value of molybdenum red. The author stated that his own car had been lacquered with this pigment with two coatings. The particle size distribution has indicated that the particles show Brownian movement. Further measurements are in progress. The Cromophtale pigments are absolutely non-saponifiable and are resistant to aging.

These new pigment groups are comparable with the naphthol series, but as mentioned, the two reaction stages are transposed, i.e. the coupling occurs before the condensation. This reaction series offers the advantage of an easier arylide formation of these relatively large molecules.

The technico-finish characteristics of the Cromophtale pigments are primarily determined by the high molecular weight and the absence of active groups; the low specific gravity of the pigment leads to high absorption and the sedimentation is extremely low. These new pigments would seem to have a particular future for red color tones as up to now, insoluble red pigments have not been available. These pigments will be on the market by the middle of 1956.

Wool Scale for Determination of Light Fastness of Pigments, Finishes

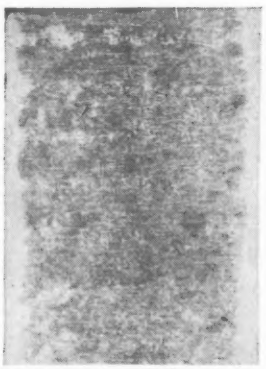
By R. Haug.

It was first mentioned that the relatively constant coloration of wool was used for the first time in the textile industry about 25 years ago in order to obtain a comparison with the color changes of other textiles under the influence of light. The very good reproducible results which were obtained in this way led to the introduction of the Wool Scale in this industry.

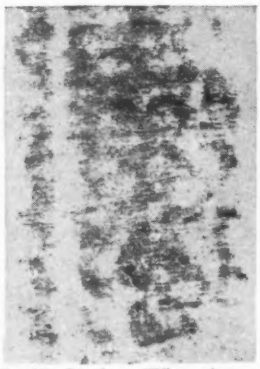
At the Stuttgart Pigment and Paint Research Institute work was conducted to test the applicability of this wool scale as a full range light scale also to paint and finish technology. It must be considered in this connection that the spectral distribution of light with daylight, skylight and sunlight, is very different and accordingly, a very careful choice of the light source becomes necessary if artificial lighting is to come into consideration.

Lighting tests which are conducted with natural sunlight have the advantage of corresponding to practical service conditions and are relatively cheap to carry out. The same holds good, of course, for open-air weathering tests under natural conditions. With the evaluation of daylight exposure tests, it has not been possible to measure in a simple manner, the sum-total effect of the light action. The Wool Scale had proved very satisfactory for the adjudication of the light-fastness of textiles. Observation over a prolonged period had shown that the change of the wool test pieces through the sunlight, followed a good reproducible course. The object of the present work was to calibrate and standardize the Wool Scale to make possible its applicability as a simple and cheap integrated Luxmeter. Wool test pieces of the Wool Scale were illuminated with natural sunglight simultaneously with an electrical light-sum counter after Dr. Neugebauer, and the change in the color tone was established with the aid of the color measuring process according to DIN 6164. The influence of the changing composition of the daylight was further discussed.

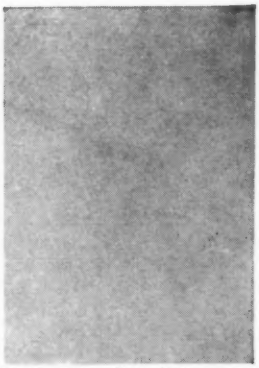
The above work represents for the first time the creation of a basis for finding a relation between the German Standard DIN Color Tone Standard



Panel 1—Copolymer "A" on asbestos cement panel after 50 wet rubs.



Panel 2—Copolymer "B" on asbestos cement panel after 50 wet rubs.



Panel 3—"Elvacet" on asbestos cement panel after 1,000 wet rubs.

For water-base paints with superior low-temperature coalescence—ELVACET®

POLYVINYL ACETATE EMULSIONS

The unretouched photographs above tell the story. After only 50 wet rubs with a Gardner Washability Machine—Panels 1 and 2 showed complete paint failure. Film integrity was low, indicating poor coalescence. These panels were painted under controlled conditions at 40°F. with formulations based on copolymer polyvinyl acetate emulsions. In each case, the manufacturer's suggested formulation *included the use of a coalescing agent.*

Panel 3 was painted with a Du Pont suggested formulation based on "Elvacet"* at the same temperature and under the same controlled conditions as Panel 1 and 2. This third panel showed no sign of failure, even after 1,000 wet rubs.

Results such as these plus easy application, resistance to fading and yellowing, alkali resistance, fast-drying properties, and extensive exposure data help make "Elvacet" the most popular polyvinyl acetate emulsion for preparation of fast-selling exterior masonry paints.

*REG. U. S. PAT. OFF.

ELVACET
Reg. U. S. Pat. Off.
polyvinyl acetate emulsions
DU PONT
Better Things for Better Living
. . . through Chemistry

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Dept. PV-4 Wilmington 98, Del.
☐ Please send me more information on "Elvacet" for interior and masonry paints.
☐ Please have your representative call with suggested formulations.
Name _____ Position _____
Firm _____
Address _____
City _____ State _____

6164 and the Wool Scale. It was indicated in the discussion to this paper that a difficulty exists in the fact that pigments when exposed to light, could behave in a manner different from that of the Wool Scale. A prominent effect, for example, is with chrome yellow, where an after-darkening occurs. The view was advanced in answer to this that it is easier to establish a change in the bright direction. This change can also be established on the Wool Scale. The Wool Scale should only be used as a Luxmeter, and using it in this way, it could then be established to what intensity chrome yellow is after-darkened.

It was stated further that in Switzerland much work is done with an illuminating apparatus with which the test sample rotates and the moisture content is regulated. The intermediate tones, such as 7½, are also established by admixture of two test parts, 7 and 8.

An important fact is the possible use of artificial light sources which contain a high portion of short wave rays and which do not conform with the spectral composition of sunlight. The question was posed as to whether from the Wool Scale, conclusions could be drawn as to what corresponding sunlight illumination this artificial light source is equivalent. It was stated that tests conducted with the quartz lamp light source are found to run quite differently from those conducted with direct sunlight illumination. It is hardly possible to make comparative values. The difficulties in this connection were indicated when it was suggested that the quartz lamp radiation could be filtered through a filter glass, infra-red radiation added, and, in this way, a radiation resembling sunlight could be obtained; it was, however, stated in answer that infra-red radiation had not been found satisfactory for the tests.

Polyvinylacetate as Basis For Dispersion Finishes

H. Koch.

The author first briefly surveyed the development of the full-synthetic bonding agents. The older lacquer industry in its beginnings, used exclusively natural products and these still play a most important role today. With the investigation of the raw materials, desire for improvement very quickly arose. This could only be satisfied by way of the synthetic products, and finally, one had attained in this way the development of the dispersion type finishes.

Vinylchloracetate may be regarded as the original product in this field. But it was only with its further development to polyvinyl acetate (Mowilith) that the desired results had been obtained by the lacquer industry.

The polyvinyl acetate dispersions have been introduced into the lacquer industry, particularly in Germany. In other countries and especially in America, on the other hand, one had worked more on the basis of butadiene-styrol and had used polyvinyl acetate principally for an adhesive. The satisfactory service which Mowilith had given for many years had, however, caused even America to increase production of vinyl acetate further and with the obvious intention of employing these increased amounts in the finish industry. The author then dealt further with the influence of plasticizers on the durability of Mowilith finishes. In this connection, it was particularly interesting that even Mowilith films which were 14 years old still contained 50% of their plasticizer. Mention was then made of a new, finely dispersed form of polyvinyl acetate, as it is precisely the size of the individual particles which is significant for the characteristics of the product.

With the co-use of a stabilizer consisting mainly of polyvinyl acetate, it is also possible to work alone with finely dispersed products. Through this, there is obtained increased gloss and outstanding wet-wiping resistance. The combination of such types (Mowilith V) with the usual Mowilith D marks is possible. The author indicated that the production of new products which would occupy a middle position between those now available, is planned.

If you like skins

ON YOUR PAINT, DON'T READ THIS...

Paint manufacturers are switching to NILSKIN, an anti-skinning agent available only from Naftone, Inc.... why? because its action is complete, without hindering in any way, the drying of the coatings.

NILSKIN completely evaporates from the film.
NILSKIN does not leave any residual product in the film.
NILSKIN has no unpleasant odor and will not develop one during storage.
NILSKIN is almost colorless and will not darken during storage!
NILSKIN will not stain whites, nor cause tints and pure colors to change shade in the can.
NILSKIN will not cause color change during baking.
NILSKIN has not caused gelation.
NILSKIN does not require specially lined drums.

Not a by-product, but a chemical specifically designed to stop skinning in paints and varnishes, Nilskin is absolutely uniform. From the performance standpoint alone, it has been so outstanding that you should incorporate Nilskin into your formulations. Contact us today for your immediate supply.
NAFTONE, INC., 515 Madison Ave., New York, N. Y.

NAFTONE INC

SOUTHERN CLUB

(*From page 40*)

Bill Lutz as chairman. This committee is made up of purely scientific minded men from the industry. It will be concerned soley with the scientific approach to projects in our laboratory."

One of the committee's projects, he asserted, will be a complete study of all products which are replacing paints, varnish and lacquers, to determine what advantages they may have over our products and where our products will give better service and greater economy."

A highlight of the convention was a panel on "Modern Paint Making Machinery," moderated by John J. Hughes, Jr., technical director, Mobile Paint Mfg. Co. Panel members were: Oakley H. Garlick, president, Paul O. Abbe, Inc.; L. S. Behrns, vice president, Kinetic Dispersion Corp.; Oliver F. Redd, technical director, The Patterson Foundry and Machine Co.; George E. Missbach, Morehouse-Cowles, Inc.; Sid Klein, technical director, Herman Hockmeyer & Co.; Charles R. Holman, general manager, Pittsburgh Plate Glass Co.; W. S. Herner, plant superintendent, The Glidden Co. A question and answer session followed the panel discussion.

Norman Kelley, speaking on "The Role of the Technical Man in Purchasing," said that the purchasing agent can no longer be simply given a "shopping list" to go into the market and buy each item as best he can. The concept of the purchasing function has been radically revised as to what it should include, how it should be organized, what of people it requires, and what its relationship should be to other departments, he said.

"I think every one will agree," he said, "that purchasing raw materials in the paint industry today is one of the most important functions of an efficiently operated firm. Equally important is the role of the technical man in this function because the intelligent performance of the purchasing department is dependent in very large measure upon the know-how, the technical experience and the complete cooperation of the technical department.

Anhydrous Alcohol Unit

Dr. Robert E. Hulse, general manager of the U. S. Industrial Chemicals Co. Division of National Distillers Products Corp., has announced that a new anhydrous alcohol unit has come on stream.

It is located at the National Petro-Chemicals Corp. plant at Tuscola, Ill.

Witco Sells Properties

The sale by Witco Chemical Co. of all its oil and gas producing properties, amounting to 25 oil and gas wells, has been announced by R. I. Wishnick, Witco board chairman.

Fifteen of these wells were sold to Producing Properties, Inc., of Dallas, Texas, for approximately $1,750,000. Formerly owned by Witco Oil and Gas Co., a wholly owned subsidiary of Witco Chemical Co., these properties are located in Moore, Hutchinson and Carson Counties of Texas, and Rio Arriba County, New Mexico.

Standard Ultramarine

Standard Ultramarine & Color Co., Huntington, W. Va. has announced the opening of its own sales office in Chicago. John L. Marple, assisted by Harry A. Davenport, will supervise operation of the office at 5967 W. Madison St.

Propionic Acid Available

Propionic acid made from Oxo-derived propionaldehyde, is now being supplied in tank car quantities, according to an announcement from W. A. Woodcock, manager, fine chemicals department, Carbide and Carbon Chemicals Co.

MONSANTO CAN HELP YOU!

A full line of resins for your surface coatings

Monsanto technical experts in the field are always ready to advise and assist you on any production problem. You can count on quick delivery from plants and warehouses across the country from the industry's widest line of melamine and urea resins, styrene latices and resins, and phenolic resins and thickening agents for all aqueous systems.

Resimene*	Amino Resins for Baking Finishes
Resinox*	Phenolic Resins for Baking Finishes
Styrene	Latices and Resins for Coatings Formulations
Opalon*	Polyvinyl Chloride Plastisol Resin
Lytron*	Polyelectrolytes for Thickening Aqueous Systems
Resin 810 and 820	—emulsifier and dispersant

For additional information and data sheets write to Monsanto Chemical Company, Plastics Division, Room 803 Springfield 2, Mass.

MONSANTO

*RESIMENE, RESINOX, OPALON, LYTRON: REG. U. S. PAT. OFF.

LIGHTING—

(*From page 34*)

with a second illuminant to check the correctness of his impression as to what corrective actions should be taken and, as a result, avoid the possibility of metameric matches.

Time does not permit additional discussion on the use of special lighting for color uniformity. Even though the color matcher is able to obtain a good match and is using proper illumination, it is not always possible to obtain uniform color in production. Properly designed lighting for color inspection, sorting, or grading, can be advantageously employed toward achieving better color uniformity. This might be a subject for future discussion.

This discussion can be summed up in an unorthodox way by stating that a color matcher could learn to do his work under any source of illumination, including candle light, if he had sufficient years of experience with any particular illuminant. However, it does not seem sensible to have to completely re-establish the information in the color matcher's color memory circuit by the use of a source of light which is different from the original benchmark which established the color matcher's ability in the first place. This can be said in another way by drawing an analogy between the human eye and the light source and an audio-amplifier and loud speaker. The audio-amplifier might be capable of high fidelity frequency response, but if a small speaker is attached, the sound which is produced is limited by the quality which the speaker is capable of delivering. By the same token, the human eye is not able to detect any more critically than the light will permit it to see color differences.

•

Battelle To Do Molybdenum Chemical Research Work

Battelle Institute, Columbus, Ohio, will conduct for Climax Molybdenum Co. certain phases of an expanded molybdenum chemical research program now under way at Climax, according to a joint announcement by Clyde Williams, Battelle president, and Alvin J. Herzig, Climax vice president of research, and president of the subsidiary company, Climax Molybdenum Company of Michigan, which concluded the agreement.

Under the terms of a one-year contract, Battelle will conduct research aimed at finding new applications for existing molybdenum chemicals. The first phase of this work will be directed at broadening the use of phospho- and silicomolybdates, now used in the organic pigment industry. Battelle will also evaluate the technical feasibility of new applications for such molybdenum chemicals as the normal molybdates, the cyanomolybdates and molybdenum disulfide. It will also survey potential markets represented by new uses for these chemicals.

In detailing Battelle's research activities under the new contract, Mr. Herzig emphasized that it will supplement the expanded research program now being conducted at Climax's Detroit Research Laboratories. There, a new chemical group is currently concentrating on investigation of organomolybdenum compounds and molybdenum chemicals used as catalysts, corrosion inhibitors, and lubricant additives.

TOPS IN THEIR CLASS!

✓ Long on Quality
✓ Low in Cost

SHARPLES CHEMICALS Division
PENNSYLVANIA SALT MANUFACTURING COMPANY
Pennsalt Chemicals
500 Fifth Ave., New York • 80 E. Jackson Boulevard, Chicago • 106 S. Main St., Akron
Executive Office: Philadelphia, Pa.
Martin, Hoyt & Milne Inc., San Francisco • Los Angeles • Seattle • Portland
Shawinigan Chemicals, Ltd.: Montreal • Toronto
Airco Company International, New York

EPOXIDATION—(*From page 31*)

hydrogen peroxide concentration. As a rough approximation, potentially detonatable mixtures will be formed when the hydrogen peroxide represents about 1/3 by volume of the final mixture, for example, 3 ml. of 90% H_2O_2 in 10 ml. of total reactants. The line of demarcation between an explosion and no explosion is not sharp. Consideration should be given to the possibility of phase separation or shifting of a composition into the impact-sensitive range during the course of the reaction.

Impact-sensitive mixtures of H_2O_2 and organic material vary greatly in sensitivity. Many require considerable initiating energy to set them off. Nevertheless, under no circumstances should an organic oxidation reaction with hydrogen peroxide or organic peracid be carried out with a mixture that falls in this range.

From a practical standpoint the dangerous region is one of hydrogen peroxide concentration far in excess of that normally encountered in oxidation reactions. Slow and controlled addition of hydrogen peroxide to the reactants is one of the most effective means of avoiding impact-sensitive mixtures. The reaction should be carried out in such a way that a considerable portion of the total hydrogen peroxide employed has reacted on completion of the addition.

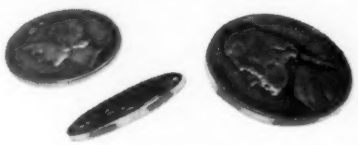
General safety precautions to be taken in carrying out oxidation reactions with hydrogen peroxide or peracids are summarized:

1. Personnel should wear rubber gloves and safety glasses.
2. Reactors and storage vessels should be provided with vents.
3. Oxidizing agents should be stored in cool places.
4. All spilling should be generously flushed with water.
5. Hydrogen peroxide, peracids and reactors should be protected from contamination.
6. Oxidant once removed should never be returned to the reactor.
7. Laboratory reactions should always be run behind a safety shield.
8. Hydrogen peroxide and peracids should always be added to organic material, and never the reverse.
9. Hydrogen peroxide and peracids should be added slowly.
10. Reaction mixtures should always be stirred while hydrogen peroxide or peracids are being added.
11. Cooling facilities should be provided for all reactions.
12. Reaction products should never be recovered from the final reaction mixture by distillation unless residual peroxides have been destroyed.
13. Large-scale reactors should be provided with water flooding and rapid dumping facilities.
14. Peracids and H_2O_2 should not be splashed on the wall of the reactor in large-scale operations. A perforated pipe partially dipping under the liquid surface is suggested for feeding H_2O_2 into the reactor.

IT'S NOT

NLY

THE MONEY!



It's easy enough for you to save money in your lacquer formulations—if you're willing to use ingredients that sacrifice quality.

ZINFLEX, the modified shellac lacquer additive, is that rare exception—an ingredient that saves you money by enabling you to produce *superior* finishes!

ZINFLEX is modified for greater compatibility with hydrocarbon solvents. You can use *more* of it in your lacquers and at the same time gain the following advantages:

In Wood Lacquers

- *lighter, clearer, deeper finish*
- *better adhesion, elasticity, mar resistance*
- *high oil and naphtha resistance*
- *high solids content at working body*

In Metal Lacquers

- *greater adhesion to brass, aluminum, tin plate and steel*
- *better build*
- *improved flexibility*
- *greater hardness*
- *PLUS all the benefits Zinflex gives to wood lacquers*

Used successfully by leaders in the wood and metal lacquer field.

Made by the makers of BULLS EYE® Shellac.

Write on your letterhead for technical data, suggested formulations and a generous test sample of ZINFLEX.

WILLIAM ZINSSER & CO.

offices and factories at

516 West 59th Street
New York 19, N. Y.

319 N. Western Ave.
Chicago 12, Ill.

Metallic Soap Development Traced By Witco Rep

Paint men should bring their problems to soap manufacturers William Blalock, west coast technical representative for the Witco Chemical Co., recently told a joint meeting of the Pacific Northwest Paint and Varnish Production Clubs meeting in Seattle, Wash. His talk was entitled, "Recent Developments in Metallic Soaps for the Paint Industry."

In tracing these developments, Mr. Blalock explained the methods Witco used to develop new or special products. Small-scale equipment is set up in the laboratories, duplicating as far as possible the customer's equipment and operating procedures.

This way, Witco can evaluate the product under simulated commercial conditions, and a newly developed product can be adapted more easily to the customer's processing procedures, he asserted.

Several products designed to solve specific problems have resulted from these methods. As examples, Mr. Blalock named Witco Zinc Stearate Lacquer Grade #3, a non-gel grade permitting pigment suspension and flatting without thickening, and Witco Zinc Soap #26, designed to thicken hydrocarbons without the use of heat.

GET SURE 3-WAY PROTECTION

... with Nopco anti-foamers for latex paints!

FASTER PRODUCTION!
Cuts excessive foaming during processing!

EASIER PACKAGING!
Gives sure density control, no need to settle paint before packing!

BETTER BRUSHING!
Avoids spotting, fish eyes or bubbles when applying!

And Nopco anti-foamers are truly economical to use also! We have a wide selection of proven anti-foamers . . . for all three major systems of latex paint. So the Nopco technical man can pick out the one best fitted to your specific needs. Why not write for further information today! Nopco Chemical Company, Harrison, N. J.

NOPCO

PLANTS: Harrison, N. J.
Cedartown, Ga. • Richmond, Calif.
London, Ont. Canada

CALENDAR OF EVENTS

April 8-13. ACS Spring Meeting, Div. of Paint, Plastics, and Printing Ink Chemistry, Dallas, Tex.

April 23-24. American Oil Chemists' Soc., Shamrock Hotel, Houston, Tex.

May 10-12. Southwestern Paint Convention, Joint Dallas and Houston Paint and Varnish Production Clubs Meeting, Statler-Hilton Hotel, Dallas.

May 25-26. Annual Symposium of the Pacific Northwest Paint and Varnish Production Club, Hotel Multnomah, Portland, Ore.

Production Club Meetings

Baltimore, 2nd Friday, Park Plaza Hotel.

Chicago, 1st Monday, Furniture Mart.

C.D.I.C., 2nd Monday.
Cincinnati — Oct., Dec., Mar., May, Hotel Alms.
Dayton — Nov., Feb., April, Suttmilers.
Indianapolis — Sept., Claypoll Hotel.
Columbus — Jan., June, Fort Hayes Hotel.

Cleveland, 3rd Friday, Harvey Restaurant.

Dallas, 1st Thursday after 2nd Monday, Melrose Hotel.

Detroit, 4th Tuesday, Rackham Building.

Golden Gate, 3rd Monday, E. Jardin Restaurant, San Francisco

Houston, 2nd Tuesday, Bill Williams Restaurant.

Kansas City, 2nd Thursday, Pickwick Hotel.

Los Angeles, 2nd Wednesday, Scully's Cafe.

Louisville, 3rd Wednesday, Seelbach Hotel.

New England, 3rd Thursday, University Club, Boston.

New York, 1st Thursday, Brass Rail, 100 Park Ave.

Northwestern, 1st Friday, St. Paul Town and Country Club.

Pacific Northwest, Annual Meetings Only.

Philadelphia, 3rd Wednesday, Philadelphia Rifle Club.

Pittsburgh, 1st Monday, Gateway Plaza, Bldg. 2.

Rocky Mountain, 2nd Wednesday

St. Louis, 3rd Tuesday, Kings-Way Hotel.

Southern, Annual Meetings Only.

Toronto, 3rd Monday, Oak Room, Union Station.

Western New York, 1st Monday 40-8 Club Buffalo.

TECHNICAL Bulletins

SOYBEAN STATISTICS

The 1956 edition of the Soybean Blue Book, 160 pages, has assembled for quick reference the latest available statistics on production, prices and utilization of soybeans, meal and oil.

There are directories of soybean processors, oil refiners, and manufacturers using soy products in their operations, as well as firms offering their services and products to the soybean industry. Included this year is full information about the revised federal grading standards and steps in soybean grading. Available at $3 per copy from the American Soybean Association, Hudson, Iowa.

SEQUESTERING AGENTS

Geigy Industrial Chemicals, Division of Geigy Chemical Corp., 89 Barclay St., New York 8, N. Y., has published a bibliography of its sequestering agents entitled, "Sequestrene Ethylenediamine Tetraacetic Acid." The bibliography covers 1953-1954.

CHLORINATED PARAFFIN

A 38-page booklet on "Chlorowax," a versatile chlorinated paraffin, is available from Diamond Alkali Co., Chlorinated Products Division, 300 Union Commerce Building, Cleveland 14, Ohio.

The product, available in resinous as well as liquid form, is discussed in its principal uses in both forms. Also discussed are compatibility, heat stability, specific gravity, solubility, viscosity, and miscibility.

ALCOHOL ESTERS

The 1956 issue of "Esters by Glyco," a 24-page catalog, describes the fatty acid esters of glycerol, glycols and polyethylene glycols. Catalog includes tables of the physical and chemical properties of these non-ionic surface active agents and also describes special grades of edible surface active agents and emulsifiers for food applications. Copies are available from Glyco Products Co., Inc., Empire State Building, New York 1, N. Y.

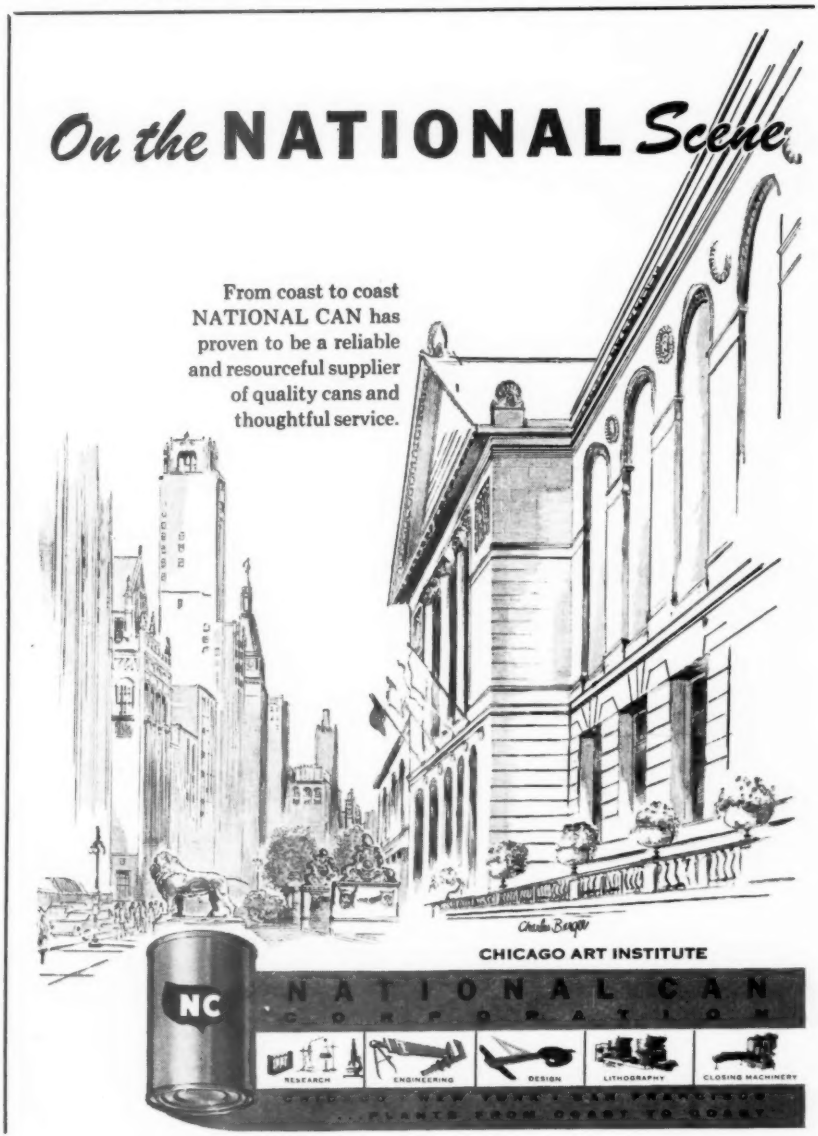
DICTIONARY of COLOR NAMES

The National Bureau of Standards, with the cooperation of the Inter-Society Color Council (ISCC), has published a dictionary that not only includes color names from the various fields of application but also relates all the names listed to a common, fundamental system of designation. It lists and describes 7500 individual color names. Listings are arranged in such a way as to permit anyone to translate rapidly and accurately from one color vocabulary to another. The dictionary, published as NBS Circular 553, is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $2.00 ($2.50 foreign).

PIGMENT DISPERSION

The new Gaulin Sub-Micron Disperser is covered in a 4-page folder, bulletin No. S-M-D-55, published by the Manton-Gaulin Mfg. Co., 44 Garden St., Everett, Mass.

The machine is presented as having nine special features where its exceptional high velocity sheer will improve product quality and reduce production costs. Construction and operation of the Sub-Micron Disperser are covered, along with specifications and a detailed description of how the S-M-D is applied to all types of pigment dispersions. The special Gaulin dispersion valve, which is a feature of the S-M-D, is shown in cutaway view and its operation is described in detail.



ONE STOP • ONE STOP • ONE STOP • ONE STOP SERVICE

FOR ALL COLORS, MINERAL FILLERS AND PIGMENTS

ASBESTOS
BARYTES
BENTONITE
BLANC FIXE
BLUES
BROWNS
CALCIUM CARBONATES
CARBON BLACK
CHROME COLORS
CHROMIUM OXIDES
CLAYS
COPPER OXIDE
GILSONITE
GRAPHITE
IRON OXIDES
LAMP BLACK
LITHARGE
LIME
LITHOPONE
MAGNESIUM CARBONATE
MAGNESIUM OXIDES
MANGANESE OXIDE
MICA
PUMICE STONE
REDS
RED LEAD
SIENNAS
SILICAS
STEARATES
TALCS
TALL OIL
UMBERS
YELLOW OCHRES
ZINC OXIDE
ZINC YELLOW

Serving Effectively for Nearly Four Decades

SMITH CHEMICAL & COLOR CO., INC.
55 JOHN STREET BROOKLYN 1, NEW YORK
FABRICATORS OF MINERAL COLORS—Agents for NATIONALLY KNOWN MANUFACTURERS

PHOTOVOLT
pH Meter MOD. 115

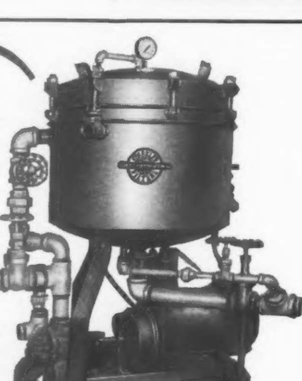
A full-fledged line-operated pH Meter of remarkable accuracy at the unprecedented price of **$115.-** (complete incl. electrodes)

Write for bulletin #225 to

PHOTOVOLT CORP.
95 MADISON AVE. NEW YORK 16, N. Y.

Remove "Fish Eyes", Skins, Incidental Solids and Semi-Solids from Varnish and Lacquer with ....

SPARKLER FILTERS



Model 18-S-12
Varnish Filter
(steam jacketed)

Many varnish makers now use Sparkler Filters to clarify varnish, lacquers, and other clear liquids. The brilliance and polish obtained by filtering with Sparkler Filters is far superior to results obtained with other methods of clarifying paint products.

Our engineers are ready to give personal attention to your problems.

SPARKLER horizontal plate FILTERS

SPARKLER
MANUFACTURING COMPANY
MUNDELEIN, ILL.
Makers of fine filtration installations for industrial use for over a quarter of a century

WATER GROUND
MICA

ALSIBRONZ
EXTENDER PIGMENTS
for:

PRIMER - SEALERS
HOUSE PAINTS
LATEX - EMULSIONS

FRANKLIN MINERAL PRODUCTS
COMPANY
FRANKLIN, NORTH CAROLINA
CORPORATED 1926
Agents in Principal Cities

SPEED REDUCERS

A new 52-page bulletin, "Farrel Speed Reducers," No. 450, is available from Farrel-Birmingham Company, Inc., Ansonia, Conn.

This is a comprehensive, well-illustrated booklet which contains full information about the complete line of Farrel speed reducers, which has been recently re-engineered, rerated and expanded. Included are horsepower rating tables, specifications, dimensions, weights, and other data needed for quick selection of speed reducers for various applications.

RADIOISOTOPES

A revised Radioisotope Catalog is now available on request to scientific institutions, medical centers, industrial laboratories and other qualified persons, according to an announcement made by the Oak Ridge National Laboratory, which Union Carbide and Carbon Corporation operates for the Atomic Energy Commission.

Nearly 100 different radioactive preparations made and distributed by the Laboratory are listed together with their respective specifications and price. Special sections of the book are devoted to descriptions of the irradiation facilities in use, procedure for the procurement of isotopes, shipping information, special sources available, service or custom irradiations, neutron-activation analysis, and the Laboratory's waste disposal service for users.

The catalog, or information about radioisotopes produced at Oak Ridge National Laboratory, may be obtained by writing to Oak Ridge National Laboratory, Union Carbide Nuclear Co., Radioisotope Sales Dept., P.O. Box P, Oak Ridge, Tenn.

PAINTING MACHINE

A new brochure on an automatic oscillating gun pressure contact painting machine is available from Conforming Matrix Corp., 402 Factories Building, Toledo 2, Ohio.

It includes illustrations and complete description of the Model PC 10 self-contained completely enclosed machine for single color decorating of small and medium size parts, with painting areas up to 6″ x 8″.

AEC REPORTS

Two price lists of technical reports released by the Atomic Energy Commission for sale to the public are now available from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

Price List No. 25 is OTS's semi-annual cumulative listing of its printed AEC reports for sale and supersedes Price List No. 24, issued last August.

TID-1901, the AEC's "Report Announcement Bulletin," is a listing of reports just made available under the Commission's stepped up program of declassification and release of reports. Some of these reports are not listed in Price List No. 25.

For those interested in obtaining AEC reports as soon as they are released, OTS lists new reports each month in its *U. S. Government Research Reports*, a subscription publication available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at $6 a year ($3 additional for foreign mailing).

G. E. FLEXIBILITY TESTER

Gardner Laboratory, Inc., Bethesda 14, Md., has published Newsletter No. 14 which, among many new items and instruments, describes the new General Electric Impact Flexibility Tester.

St. Joe lead-free Zinc Oxides for Protective Coatings

The ore from which St. Joe lead-free Zinc Oxides are mainly produced originates in the foothills of the Adirondack Mountains, where the St. Joseph Lead Co. wholly owns and operates zinc mines at Balmat and Edwards, St. Lawrence County. These properties are among the greatest zinc deposits in the United States. The concentrates produced here are shipped to our electrothermic zinc smelter at Josephtown, Pa. for conversion into zinc oxides by the direct-from-ore, or American Process. Quality control – one of St. Joe's most important production tools—literally begins underground at the mine and is exercised at each step of the process by the technological staffs of laboratories located in our mines, mills and the smelter. The ores, equipment and procedure used in the production of St. Joe High-Grade Zinc metal of 99.98+% purity – and commanding a premium market price – are identical with those used in the production of St. Joe lead-free Zinc Oxides. This quality-factor accounts for their steadily increasing use in protective coatings.

*from ORE – *The Balmat Mine: The mine, mill and town of Balmat, N.Y., developed and built by the St. Joseph Lead Co., between 1926 and 1938. The Company's other mine and mill is located in the nearby town of Edwards, N.Y.*

*to OXIDE – *The St. Joseph Lead Company's smelter and zinc oxide plant at Josephtown, Pa., on the south bank of the Ohio River about 30 miles northwest of Pittsburgh.*

ST. JOSEPH LEAD COMPANY
250 Park Avenue, New York 17, N. Y.

Time Flies in ATLAS Weather-Ometers

Write for complete Weather-Ometer® catalog.

In developing new paint products—the new Atlas Weather-Ometer Model DMC will give accurate dependable forecasts of the weathering durability and color fastness of the product. Test programs can be exactly duplicated at any time to give accurate comparative data of various formulas.

For quality control in production — the Weather-Ometer is useful in maintaining the quality standard of the product, by checking each batch run for any deviation from the established weathering and light fastness standards.

Accuracy in test results is greatly increased in the DMC Weather-Ometer by a positive control of specimen temperatures. Automatic humidity control up to dew point is available as optional equipment.

Both horizontal and vertical testing is available. Shallow containers are used for semi-liquid material and vertical panels for solids.

All automatic controls including complete voltage controls are located on the front panel above the test chamber door. Source of light is two Atlas enclosed violet carbon arcs.

ATLAS ELECTRIC DEVICES CO.

4114 N. Ravenswood Ave., Chicago 13, Illinois U. S. A.

Sales representatives in principal cities throughout the world.

MICA WATERGROUND AND MICRO

FOR PVA ACRYLIC EMULSIONS LATEX AND MODIFIED LATEX PAINTS

Excellent for a well-knit, durable film . . . less penetration, running and sagging . . . better adhesion and bridging . . . more washable and longer weathering.

Our finest Micro Mica is an excellent flatting agent for this type of paint.

The English Mica Co.

STERLING BUILDING, STAMFORD, CONN.

FUNGICIDAL COATINGS

The abilities of six different fungicides to suppress fungus growth on varnish films is discussed in a report of Navy research, just released to industry.

The results confirm an earlier experiment which showed *p*-toluene sulfonamide to be superior for this purpose.

The toxidants studied were pentachlorophenol, salicylanilide, phenylmercuric phthalate, uranyl nitrate, copper-8-quinolinate, *p*-toluene sulfonamide, and fifteen binary mixtures. The vehicle was a phenolic resin tung oil varnish containing 12.5 gallons of oil per 100 pounds of resin.

The primary objective of the experiment was to find the best fungicide suitable for protecting electronic equipment.

After prolonged field testing in Panama jungles, *p*-toluene sulfonamide, either by itself or in a mixture, showed outstanding performance, and use of this agent, the researchers state, should receive serious attention because it is inexpensive, plentiful, and apparently compatible with the varnish vehicle.

This report, PB 111788 *Tropical Performances of Fungicidal Coatings*, Part II, J. M. Leonard and J. D. Bultman, Naval Research Laboratory, July 1955, is available from OTS, U. S. Department of Commerce, Washington 25, price 50 cents. It contains 8 pages. Part I of this study is also available from OTS. It is PB 111737, *A Field Evaluation of Termite Repellents*, price 50 cents.

ASTM STANDARDS

The American Society for Testing Materials has completed and published its largest triennial Book of ASTM Standards. The 1955 edition has over 11,000 pages and includes more than 2,150 standard specifications, tests, and definitions for materials. The seven parts are priced as follows: Ferrous Metals, $13.50; Non-Ferrous Metals, $11.00; Cement, Concrete, Ceramics, Thermal Insulation, Road Materials, Waterproofing and Soils, $13.50; Paint, Naval Stores, Wood Cellulose, Wax Polishes, Sandwich Building Constructions, $11.00; Fuels, Petroleum, Aromatic Hydrocarbons, and Engine Anti-

freezes, $11.00; Electrical Insulation, Electronic Materials, Plastics and Rubber, $13.00; Textiles, Soap, Water, Paper, Adhesives, and shipping Containers, $11.00.

The Book of ASTM Standards, priced at $84.00, or any of its parts is available from the American Society for Testing Materials Headquarters, 1916 Race St., Philadelphia 3, Pa.

SPECTROSCOPY

Uses of ultraviolet, infrared, and x-ray spectroscopy for the analysis of fats and oils are discussed in four articles recently published by research workers at the Southern Utilization Research Branch of the Agricultural Research Service, USDA. New Developments are presented, and extensive reviews of the literature included. The information should be of considerable interest to spectroscopists, and both research and industrial chemists in the field of fats and oils.

Papers on "Infrared Absorption Spectra" and "Ultraviolet Absorption Spectroscopy," both by Robert T. O'Connor, and "X-Ray Spectroscopy" by W. S. Singleton, were published in the November, 1955, issue of *The Journal of the American Oil Chemists' Society.* A fourth paper, "Application of Infrared Spectrophotometry to Fatty Acid Derivatives," by O'Connor, was published in the January, 1956, issue of the same journal.

CHEMICAL BULLETINS

An up-to-date listing, with brief descriptions, of all its available chemical bulletins, has just been issued by Climax Molybdenum Co., Dept. L, 500 Fifth Ave., New York 36, N. Y. Designated Ch-3, this 4-page compilation lists literature available in the following categories: Chemical Data Series; Agriculture; Analysis; Ceramics; Catalysts; Colors.

GEAR-MOTORS

An 8-page two-color bulletin, E-2408, "Reduce Speed," describes the new line of Reliance Gearmotors—the first line of gearmotors available incorporating new NEMA motors and completely redesigned according to the company.

The first section presents examples of the wide selection of types, mountings, enclosures, and ratios available to afford custom gearmotors for all applications. Another section illustrates the simplified maintenance through ease of motor and gear replacement—with an exploded view of a typical gear assembly. The selection section explains the Reliance unit type construction that allows for selection of gearmotors to exactly meet the user's specific requirements. Included in the listing are types of gearmotors, types of service, output speeds, horsepowers, electrical characteristics, enclosures, and types of mountings. Available from Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, Ohio.

CLASSIFIED ADVERTISEMENTS

Rates: $.20 per word, except those seeking employment, for which rate is $.10 per word. Minimum: ten words. Address all replies to Box Number, c/o Paint and Varnish Production, 855 Avenue of the Americas, New York 1, New York.

Sales Technician
Paint Industry

Growing chemical division of large U. S. corporation requires three salesmen to call on paint manufacturers in Boston, New York and Cleveland areas. Age 25 to 40 with BS degree and two years experience or with five years experience in paint industry. Salary OPEN. Expenses paid and company car furnished. All benefits. Send complete resume in full confidence to Box 401.

Why was the little schoolhouse RED?

AT THE turn of the century "the little red schoolhouse" was a familiar sight in the land. Because money came hard, these little frame structures were painted only infrequently. To protect their exteriors from the ravages of the elements, paints containing weather-resistant red iron oxide were used—the iron oxide lending its color as well as its durable protectiveness.

REICHARD-COULSTON produced much of the rich, red iron oxides which went into those long-lasting "little red schoolhouse" paints.

During our 101-year history, REICHARD-COULSTON has kept pace with the technical advances in the paint industry. Part of the results of this continued growth are REICHARD-COULSTON IROX and SOFTEX synthetic reds. These synthetic red oxides are valued for their color softness, fine particle size and exceptionally rich color. Manufacturers prefer them for enamels, latex emulsions, ranch red house paints, alkyd flats and all finishes requiring high tinting strength pigments.

Find out how REICHARD-COULSTON colors such as IROX and SOFTEX reds can help *your* production. For free laboratory samples and technical data, write today.

Natural IRON OXIDE PIGMENTS *Synthetic*

Reichard-Coulston, Inc.

15 EAST 26th STREET, NEW YORK 10, N. Y.

Warehouses in principal cities. Factory: Bethlehem, Pa. Over a century of manufacturing and service.

ADVERTISERS' INDEX

Abbe Engineering Co. 67
Advance Solvents & Chemical Div., Carlisle Chemical Works, Inc. Front Cover
American Can Co. 78
American Cyanamid Co., (Pigment Div.) 46
American Cyanamid Co., (Plastics & Resins) 3rd Cover
American Zinc Sales Co. 4th Cover
Archer-Daniels-Midland Co. Mar.
Arizona Chemical Co. Mar.
Armour & Co. 81
Aromatic Products Inc. 71
Atlas Electric Devices Co. 102

Bakelite Company, A Div. of Union Carbide and Carbon Corp. 54, 55
Baker Castor Oil Co. 61
Barrett Div., Allied Chemical & Dye Co. 15
Blach Industries, Inc. 72
Borg-Warner Corp., Marbon Chemical Div. 8

Carbide & Carbon Chem's Co., a Div. of Union Carbide & Carbon Corp. 57
Cargill, Inc. 44
Celanese Corp. of Amer., Chemical Div. 45
Celanese Corp. of Amer., Plastics Div. 24, 25
Colton Chemical Co., Div. Air Reduction Co., Inc. Mar.
Columbian Carbon Co., (Mapico Color Div.) 16
Columbian Carbon Co. (Carbon Black) 16
Commercial Solvents Corp. 89
Concord Mica Corp. Mar.
Continental Can Company 42
Continental Carbon Co. 69
Coors Porcelain Co. Mar.
Corn Products Refining Co. 91
Cuno Engineering Corp. Mar.

Davies Can Co., The 104
Davison Chemical Co., Div. W. R. Grace & Co. 48
J. H. Day Co. 83
Dicalite Division, Great Lakes Carbon Corp. Mar.
Dow Chemical Co. 74
DuPont de Nemours & Co., E. I. (Electrochemicals) 93
DuPont de Nemours & Co., E. I. (White Pigments) Insert 13
DuPont de Nemours & Co., E. I. (Pigment Dept. Colors) 47

The Eagle-Picher Co. 53
Eastman Chemical Products Co., Inc. 10
English Mica Co. 102
Enjay Co., Inc. 26

Farnow, Inc. Mar.
Fein's Tin Can Co. 52
Firestone Plastics Co. Feb.
Franklin Mineral Products Co. 100

General Aniline & Film Corp. Mar.
General Electric Co. 18
General Tire & Rubber Co. 19
Georgia Kaolin Co. Mar.
Glycerine Producers Ass'n 22
Goodyear Tire & Rubber Co. Inc., Chemical Div. 4
Grace Chemical Co. 80
Gross & Company, A 84

Harshaw Chemical Co. Mar.
Harshaw Chemical Co. (Zinsser & Co., Inc.) 20
Hercules Powder Co. 12
Heyden Chemical Co. 79
Herman Hockmeyer & Co. 87
Hope Machine Co. Mar.
Imperial Paper & Color Corp. 82
Johns Manville Corp. 60

Kellogg & Sons, Inc., Spencer 9
Kentucky Color & Chemical Co. 75
H. Kohnstamm & Co. 88
J. M. Lehmann Co. 14
Liquid Carbonic Corp. Mar.

Mapico Color Div., Columbian Carbon Corp. 16
Marbon Chemical Div., Borg-Warner Corp. 8
McDanel Refractory Porcelain Co. Mar.
Metasap Chemical Co. 90
Minerals & Chemical Corp. of America 63
Monsanto Chemicao Co., Plastics Div. 95
Monsanto Chemical Co. Organic Div. Plasticizers 58, 59
Naftone, Inc. 94
National Aniline Div., Allied Chem. & Dye Corp. 21
National Can Co. 99
National Lead Co. 49, 70
Neville Chemical Co. 85
New Jersey Zinc. Co. 66
Newport Industries, Inc. Mar.
Nopco Chemical Co. 98
Nuodex Products, Inc. 64

Oronite Chemical Co. 68

Pacific Vegetable Oil Co. 56
Pan American Chemicals, Div. Pan American Refining Co. 6
Patterson Foundry & Machine Co. Mar.
Penna. Industrial Chem. Corp. Mar.
Phillips Petroleum Co. 51
Photovolt Co. 100
Pittsburgh Coke & Chemical Co. 77

R-B-H Dispersions 86
Reichard-Coulston, Inc. 103
Reichhold Chemicals, Inc. 2nd Cover
Rhodia, Inc. Mar.
Rohm & Haas Co. 50
Chas. Ross & Son Co. 62

St. Joseph Lead Co. 101
Schnectady Varnish Co. Mar.
Sharples Chemicals, Inc. 96
Shell Chemical Corp. 3
Sinclair Chemicals, Inc. 17
Smith Chemical & Color Co. 100
Socony-Mobiloil Co., Inc. Mar.
Solvents & Chemicals Group 76
Sparkler Mfg. Co. 100

Tamms Industries, Inc. Mar.
Titanium Pigment Corporation Mar.
Troy Chemical Co. Mar.
Troy Engine & Machine Co. 92

Union Bag & Paper Co. 11
Union Carbide and Carbon Corporation Bakelite Company 54, 55
Union Carbide & Carbon Corp., Carbide & Carbon Chem. Co. 57

Velsicol Chemical Corp. 23
Vulcan Steel Container Co. 73

Williams & Co., C. K. Mar.
Witco Chemical Co. 69

G. S. Ziegler & Co. Mar.
Zinsser & Co. Inc., Sub. Harshaw Chemical Co. 20
William Zinsser & Co. 97

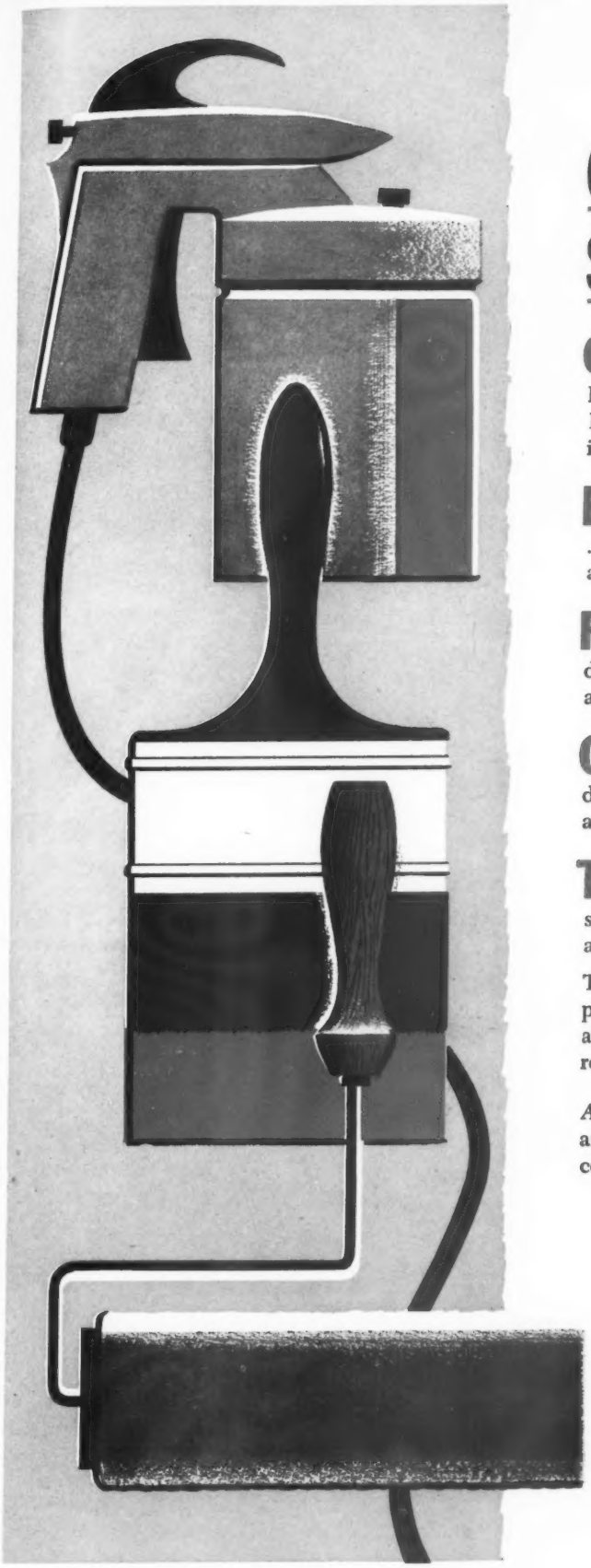
call in... **DAVIES**

if you need metal caulking cartridges or end assemblies

Top quality Davies metal cartridges have many advantages — they are far more durable, fully moisture proof and can be attractively lithographed right on the metal . . . For manufacturers using paper tubes, Davies makes end assemblies with plastic spouts and metal ferrules . . . Davies also produces many types of paint cans in sizes from one gallon down . . . For top quality containers and the best in service, *call in Davies.*

THE DAVIES CAN CO.

8007 Grand Avenue • Cleveland 4, Ohio • Phone: EN 1-5234



Great names in SURFACE COATINGS

Cymel* Alkylated Melamine Formaldehyde Resins...for exterior enamels of outstanding durability. Impart heat and light stability, surface hardness, chemical and water resistance.

Beetle® Alkylated Urea Formaldehyde Resins ... impart hardness, mar resistance, improve chemical and water resistance in baking finishes for interior use.

Rezyl® Alkyd Resins... oxidizing and non-oxidizing types; provide excellent durability, toughness, adhesion, fast dry in air drying and baking finishes.

Cycopol® Copolymer Resins... outstanding drying speed, excellent film properties. For air drying and baking finishes.

Teglac® Rosin Modified Dibasic Acid Resins... superior color retention and high gloss for varnishes and lacquers.

These famous Cyanamid trade names include many important new developments we would like to tell you about. Write for complete technical data on any of these resins describing the nature of your application.

Also available from Cyanamid: Phthalic anhydride... metallic stearates... nitrocellulose.

CHEMICAL PROGRESS WEEK-APRIL 23-29

*Trademark

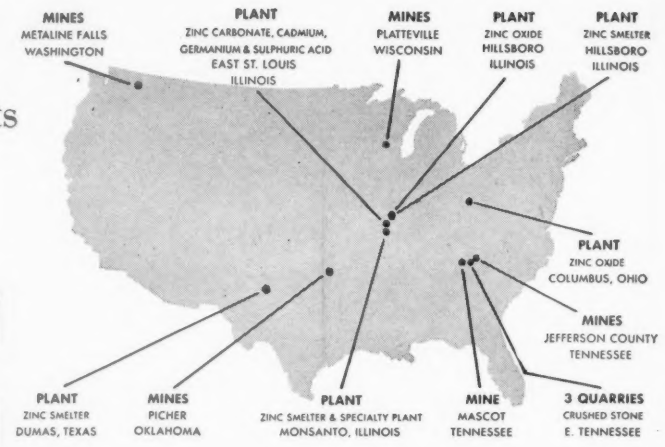
CYANAMID

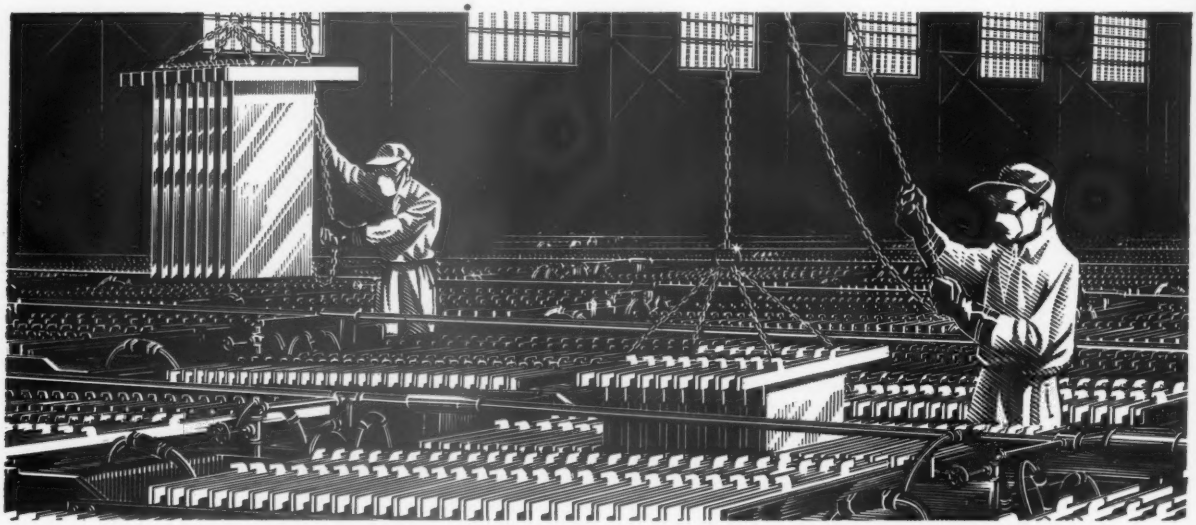
AMERICAN CYANAMID COMPANY
PLASTICS AND RESINS DIVISION
34-P Rockefeller Plaza, New York 20, N. Y.

Offices in: Boston ... Charlotte ... Chicago ... Cincinnati ... Cleveland ... Dallas ... Detroit ... Los Angeles .. New York Oakland ... Philadelphia ... St. Louis ... Seattle.
In Canada: North American Cyanamid Limited, Toronto and Montreal.

American Zinc and its products

from A *to* Z





OPERATIONS AT
MONSANTO, ILLINOIS

Modern and recently expanded electrolytic plant producing special high grade slab zinc, which is sold primarily to the die casting and brass manufacturing industries. In conjunction is a specialty plant for the production of zinc ball anodes, heavy plating anodes and anodes for cathodic protection. For complete picture of American Zinc operations, see map above.

PRODUCERS OF

ALL GRADES OF SLAB ZINC
ZINC ANODES (Plating & Galvanic)
METALLIC CADMIUM
SULPHURIC ACID
LEAD-FREE and LEADED ZINC OXIDES
ZINC CARBONATE
GERMANIUM DIOXIDE
AGRICULTURAL LIMESTONE
CRUSHED STONE

Distributors for

American Zinc sales Company

AMERICAN ZINC, LEAD & SMELTING COMPANY

Columbus, Ohio • Chicago • St. Louis • New York • Detroit • Pittsburgh

TER
O
S

IO

UNTY

ES
NE
EE

pecial
g and
ant for
des for
ations,